



# **SOCIOLOGICAL ASPECTS OF RECREATION AT ARAVAIPA CANYON WILDERNESS, ARIZONA**

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# RESEARCH SUMMARY

In July of 1985, the School of Renewable Natural Resources at the University of Arizona and the Bureau of Land Management, Safford District, entered into a cooperative agreement to evaluate the recreational carrying capacity of Aravaipa Canyon Wilderness. Aravaipa Canyon had recently been designated wilderness and the Bureau of Land Management (BLM) was concerned about gathering information to evaluate a use limitation that had been in place since 1973. During the first phase of the research project, we worked with the BLM to identify critical management issues, formulate research questions, and develop a research approach. It was decided that we would concentrate on evaluating sociological aspects of recreation in the wilderness area and the BLM would examine physical and biological aspects.

As a result of this effort, we developed and implemented a research program that went beyond simply evaluating the use limitation. Capacity limitations are but one tool that can be used by an agency to manage recreational use of a wilderness. Provision of high quality recreational opportunities for visitors requires that managers pay attention to a spectrum of variables. Consequently, our research program evolved to include a comprehensive examination of sociological, physical, biological, and managerial influences on the recreational setting. Reflecting this broadened approach, for phase two (data collection) and three (data analysis) of the research, we stated six objectives that would be accomplished by our research (Moore and Brickler 1987:13):

1. Analyze the demographics, personal characteristics, wilderness values, social behavior patterns, use purposes, and use patterns of on-site visitors; their perceptions of, expectations and preferences for, and satisfactions derived from the social, biological, and physical attributes of the recreation setting.
2. Analyze the demographics, personal characteristics, wilderness values, use purposes, and perceptions of potential visitors.
3. Analyze the interplay of social, environmental, administrative, spatial, and temporal variables; and the individual and collective influences of these variables on the recreation experiences derived by on-site visitors.
4. Analyze the influence of social, environmental, administrative, and temporal variables on the recreation choices of potential visitors.
5. Identify standards of quality held by sub-populations of on-site and potential visitors regarding attributes of the recreation setting.
6. Develop alternative management strategies to maintain or improve the quality of visitors' recreation experiences.

We also outlined data analysis tasks that would be used to accomplish these objectives (Moore and Brickler 1987:14-25). This outline was used with only minor modifications in the data analysis phase of the research.

This report explains in detail how these objectives and tasks were accomplished. In chapter 1--Introduction--we present the theoretical structure that guided our analyses. Then, in chapter 2--Study Area and Research Methods--we describe Aravaipa Canyon Wilderness and outline the data collection techniques that were used. Finally, in chapters 3, 4, 5, and 6 (respectively entitled Evaluation of the Use Limit, Social Setting, Physical-Biological Setting, and Managerial Setting), we provide detailed descriptions of the results and, in endnotes and appendices, the statistical techniques that were applied to the data.

The purpose of this section of the report is to provide a condensed summary of the results presented in the technical chapters, offer recommendations for management actions, outline a monitoring program, and relate our research to management of wilderness areas throughout the Bureau of Land Management.

## SUMMARY OF THE RESULTS

*92% of the respondents rated BLM management good and 95% reported having had at least a satisfactory experience.*

When asked to rate how well the Bureau of Land Management is managing Aravaipa Canyon Wilderness<sup>1</sup>, 53% of the respondents circled the “very good” category in the survey and 39% circled the “good” category. Furthermore, 73% of the respondents indicated that they were very satisfied and 22% indicated that they were satisfied with their visit.<sup>2</sup> These results--92% rating BLM management at least good and 95% reporting that they had at least a satisfactory experience--indicate that the respondents were very happy with the recreational setting provided by the BLM at ACW.

When examined closely, however, we find that the setting is not a static entity. Rather, it is composed of many variable components, called attributes, that influence the recreational experiences attained by visitors. Feelings of solitude, for example, varied depending on the number of social contacts visitors had. Similarly, encounters with litter, human wastes, livestock manure, and damaged trees or vegetation influenced feelings of untamed and unspoiled wilderness, in addition to the feeling that no one had been in ACW before. And, safety and danger feelings, were, respectively, raised and lowered by contacts with rangers.

Ratings of these dimensions of a wilderness recreation experience varied, then, depending on how much or what qualities of attributes visitors encountered. Because some attributes were more abundant than other attributes or of a lesser quality, experience dimensions related to those attributes were rated differently than others. For example, the quality of experiences dependent on the condition of the physical and biological setting of ACW was consistently rated lower than the quality of experiences more related to the social setting. Also, because the amount and quality of attributes varied in different zones of the wilderness area, the quality of experiences derived in those zones also varied.

Additionally, the respondent population was not a uniform entity. Its members varied according to demographic characteristics, how much experience they had, how secure they felt in a wilderness environment, what kinds of recreational experiences they desired, how self-reliant they were, and what their standards were for solitude and the condition of the wilderness environment. These traits influenced how the respondents interpreted interactions with attributes in the setting and what qualities of recreational experiences they derived.

Overall, then, the product of management at ACW was not only visitors' endorsements of the agency's work or strong feelings of satisfaction. The product was also a variety of experiences of varying qualities derived by a variety of people in a wilderness setting that is itself complex and non-uniform. In the following conclusions and recommendations we suggest refinements to the current management program. The primary purpose of presenting these recommendations is to suggest how the BLM can manipulate attributes of the setting to solve problems or conflicts that, in our judgment, are present or may be present in the future. In light of the strong public support of the current management program, though, we offer these recommendations in the spirit of fine-tuning an already well operating production process.

## CONCLUSIONS AND RECOMMENDATIONS

The following recommendations are organized according to the hierarchy proposed by Lime (1976), which was used in chapter 6, that categorizes management activities into three groups: site management, direct regulation of use, and indirect regulation of use.



**SITE MANAGEMENT** Two site management techniques treated here--signs and toilet facilities--were discussed in chapter 6. We also add a third technique, clean-up activities, because they have an impact on the kinds of attributes encountered by visitors.

**Signs.** Approximately 50% of ACW's visitor population are first-time visitors. They tend to be unfamiliar with the area and confused about what to expect. Accordingly, preferences for having interpretive and directional signs in ACW were inversely associated with the number of lifetime visits to the wilderness. New visitors encountered difficulties judging their location in the wilderness area, knowing how to find the wilderness area from the west trailhead, and being prepared for hiking in Aravaipa Creek. Some visitors also suggested that interpretive signs in the wilderness area would be desirable.

*Better signage could help visitors.*

Consistent with BLM policy, we do not recommend that signs be installed within the wilderness area. Once a visitor is familiar with how to navigate through the main canyon, travel is relatively simple and signs are unnecessary. We recommend, however, that the BLM consider providing better signage at each trailhead. Large signs with easily interpretable maps and simple instructions on conditions to expect in the wilderness area would alleviate nearly all concerns of the respondent population.<sup>3</sup>

**Toilet Facilities.** A significant number of experienced visitors suggested that toilet facilities be installed in heavy use areas of Aravaipa Canyon. They were concerned about water quality and aesthetic impacts from improper waste disposal.

*Aesthetic impacts from improper waste disposal was an issue for many respondents.*

Because of these concerns and because of the demonstrated influence of encountering human wastes on recreational experiences in ACW, we recommend three alternative courses of action. First, the BLM could construct toilet facilities at Horse Camp Canyon and possibly at Hell Hole Canyon. If constructed, the facilities should be readily accessible and obvious to visitors, made of unobtrusive materials (to alleviate aesthetic impacts), and pleasant to use (so that, unlike previous facilities, visitors have an incentive to use them). Second, the BLM could implement a "pack-it-out" waste policy where visitors are required to remove their own wastes from the wilderness area. Third, the BLM could begin to require assigned campsites. This action would disperse use throughout the canyon and, possibly, alleviate some of the negative impact of improper waste disposal. But, as noted in chapter 6, only 12% of the respondents supported the idea of assigned campsites. Consequently, implementation of this alternative would require informing visitors about the need for further regulation. Many visitors, at least at first, might object to the restriction. Nevertheless, improper waste disposal is primarily due to a lack of knowledge on the part of a sizeable portion of the visitor population. Thus, in addition to implementation of one of these alternatives, the BLM should continue to educate visitors regarding proper methods of waste disposal and the impacts of improper methods.

**Clean-Up Program.** Rangers and occasional volunteer groups currently remove trash and other materials from the wilderness area and break up fire rings. Because litter has a demonstrated negative effect on certain kinds of wilderness experiences, such efforts are laudable from that respect. The same can be said for breaking up fire rings, except that maintaining certain rings may be desirable from a management perspective. Although visitors negatively regarded campfire impacts (e.g. charred logs and ash), most were favorable toward fire rings. Many visitors (presumably inexperienced visitors) used fire rings to indicate where it was proper to camp.

Consequently, we recommend that the BLM continue its current clean-up efforts, but leave fire rings where it desires visitors to camp. Leaving a few fire rings in strategic locations throughout ACW will help concentrate use and impacts in selected locations, a desirable result in highly used wilderness areas (Hammit and Cole 1987).

*Fire rings help inexperienced visitors find sites.*

We also recommend that the BLM develop standards and limits of acceptable change (LAC's) for attributes such as litter, human wastes, livestock manure, and damaged trees and other vegetation. Encounters with each of these attributes had a demonstrated effect on recreational experiences in ACW. For most of these attributes, the standard may be set to zero. For example, no contacts with

human wastes is probably desirable. But for other attributes (e.g. damaged trees in heavily used campsites), the standard may have to be higher. In a section below, we discuss monitoring these attributes.

**DIRECT REGULATION OF USE** Recommendations for six types of direct regulatory methods employed at ACW--ranger patrols, the use limit, the group size restriction, group type restrictions, the length of stay limitation, and the advance reservation period--are presented in this section.

*Rangers are important  
in ACW.*

**Ranger Patrols.** Rangers provide information, education, and security to visitors at ACW, and, for a great number of visitors, they are an expected and even anticipated part of the wilderness experience. They also are very effective in influencing the behavior and attitudes of visitors. These roles played by rangers are particularly critical given the experience levels of many of the people who visit Aravaipa. Therefore, ranger patrols are an important attribute of Aravaipa Canyon Wilderness. We recommend that rangers continue to be a highly visible managerial input into the recreational setting.

**Use Limit.** The use limit is the primary tool employed at ACW to manage recreational use. Currently, only 50 people at any one time are allowed in the area. Based on our research, we arrived at the following conclusions regarding limitation of use in ACW. First, the number of groups encountered in ACW had a more consistent and significant influence on the recreational experiences of visitors than numbers of people met or seen. Second, a contact preference standard of one to two contacts with a medium-sized group during a one-day visit to Aravaipa Canyon was acceptable to more than 50% of the respondents. Third, if ACW was operating at its current capacity, approximately 11 groups would be present in the wilderness area and each visitor would have a 50% probability of encountering more groups than the standard. If more or less groups were present in the area, the probability would correspondingly increase or decrease.

*Group management and  
development of limits of  
acceptable change for  
social encounters in ACW  
were recommended.*

Drawing from these conclusions, we offer the following recommendations. First, we recommend that the BLM implement a policy of limiting numbers of groups rather than numbers of people. Second, we recommend that the BLM set a social contact standard of two daily contacts with a medium-sized group in Aravaipa Canyon (the canyon corridor zone--see chapter 5 for a description of this and the two other zones). (This standard would also represent the limit of acceptable change [LAC] for social contacts.) Third, because the side canyons and rimlands are refuges of solitude for visitors (chapter 5), we recommend that the BLM establish a lower contact standard (for example, one contact per day) for the side canyons and the rimlands. Finally, we recommend that the BLM establish an overall capacity limit by deciding upon an appropriate probability that the contact standard will be exceeded. With this probability, the limit can be determined with reference to figure 3 in chapter 3.

**Group Size Restrictions.** According to our research in ACW, encounters with large groups are much less acceptable than encounters with small or medium-sized groups. The maximum preferred group size appears to be about six. Although no impact on recreational experiences could be associated with encounters with large groups, we feel that the norms against large groups are significant enough to warrant further regulation of this type of user.

Accordingly, we recommend that the BLM consider regulating the number of large groups using ACW. We define "large group" in this context as meaning any group of seven persons or more. Two possible regulatory schemes are (1) allowing only one large group from each entrance into the wilderness area at any one time or (2) only allowing large groups into the wilderness area during special use periods (for example, certain weekends of the month).

As part of the regulatory program, we recommend that the BLM establish social contact standards or limits of acceptable change for encountering large groups and, conversely, small groups in the wilderness. Table 11 in chapter 4 provides valuable information for this purpose. Contact standards would be calculated by adding up from the bottom of the table until an acceptable percentage



of visitors was achieved (in chapter three, the acceptable percentage was referred to as “agreement”.) For example, a social contact standard for large groups that would be acceptable to  $\geq 50\%$  of the respondents is two contacts. A standard acceptable to  $\geq 70\%$  of the respondents is zero contacts.

**Group Type Restrictions.** Encounters with hunters, horseback riders, hikers with packstock, and nude bathers were deplored, to a lesser or greater degree, by most visitors. Encounters with hunters were particularly disfavored. But, because hunters and the general visitor population use different areas of the wilderness, conflicts between hunters and non-hunters are likely to be rare. Consequently, we do not recommend that the BLM take any further regulatory actions toward hunters.

Horseback and packstock use is a minor part of total use of the wilderness area and is already highly regulated. Accordingly, conflicts between recreational livestock users and the general population are not likely to be significant. Nevertheless, numerous comments from respondents about manure from stock fouling the wilderness area imply that even at current low amounts of use, stock users are having an impact. Stopping short of prohibiting stock from the wilderness area, management may wish to require that stock users pack manure out of the wilderness area.

Conflicts between nude bathers and anti-nudists, on the other hand, are likely to be numerous and problematic. The streams and pools that attract nude bathers to the wilderness also attract people who are less inclined to shed their clothes. Because nudity is difficult to regulate in a wilderness area, we recommend that the BLM use educational materials to change the behavior of nude bathers and the expectations of anti-nudists. Such materials could inform nude bathers to respect the sensitivities of non-nudists and to bathe in discrete locations. The materials could also warn anti-nudists that nudity, to many people, is part of a wilderness experience and nude bathers may be present in the wilderness area.

*LAC's and informational materials were recommended to mitigate potential conflicts between different types of groups.*

Finally, as with large groups, we recommend that the BLM establish social contact standards for encountering hunters, stock users, and nude bathers. Table 12 in chapter 4 contains useful information for this purpose.

**Length of Stay Limitation.** Approximately 20% of the respondents disagreed with the current policy that limits stays to three days or less. These respondents suggested a longer limitation of five days (on the average). Additionally, 36% of the visitors to ACW stayed the entire limit of three days. Presumably, a percentage of these visitors would have preferred a longer visit (many respondents voiced this desire in their comments). We assume that the three day limit was imposed to provide a reasonable balance between maximizing the number of opportunities to visit ACW and allowing visitors to tour the wilderness area. But, five day stays probably would not significantly reduce the available number of opportunities since only one weekend (when demand is highest) could be consumed in the visit. Therefore, we recommend that the BLM consider providing a limited number of opportunities for five day stays (e.g. a certain percentage of the use limit could be allocated to stays of five days).

*A longer length of stay limit and a shorter advance reservation period were recommended.*

**Advance Registration Period.** Only 15% of the visitor population reported that they had reserved their permit six months in advance. The mean advance reservation period for the entire respondent population was 2.2 months. Evidently, most respondents did not, or could not, take advantage of the entire advance period. Most respondents (56%) were neutral to or disagreed with the current reservation period. Those respondents who disagreed with the period suggested a mean alternative of 2.5 months. We recommend that the BLM verify how far in advance people are reserving permits to enter ACW. If only a small percentage of the permit requestors are taking advantage of the entire six month period, the BLM might consider reducing the advance reservation period to three months. As an alternative, the BLM could retain the current reservation period for most permits and allocate a limited number of permits for three month advance registrations.

We recommend these alternatives because the current system strongly favors people who can, or need to, plan far in advance. Based on our survey results, though, only a small percentage of the respondents fit into this category. The six month planning horizon, for two reasons, may simply be

unrealistic for most permit requestors. First, the requestor population may be composed primarily of people who cannot plan six months in advance. As Stankey and Baden (1976) suggest, some types of wilderness users are disfavored by long advance reservation periods. (In our analyses no statistical support was found for this explanation, but the results were inconclusive--see chapter 6.) Second, and possibly most important, many visitors are probably making reservations that they eventually do not confirm. Most of Aravaipa's visitors are Arizona residents. Consequently, in contrast to more distant travellers, little cost is associated with giving up a reservation (e.g. vacations or plan tickets do not have to be rescheduled and more opportunities to visit ACW are likely to avail themselves in the future). As a result, with the current system, clerical personnel may be expending an inordinate amount of time booking reservations which are not kept.

**INDIRECT REGULATION OF USE** We offer recommendations on the two types of indirect regulatory methods employed at ACW: use fees and information and education.

**Use Fees.** Currently, each visitor must pay a daily fee of \$1.50 to use ACW (unless he or she is a senior citizen, in which case \$.75 is paid). Eighty percent of the respondent population agreed with the this fee structure. Fourteen percent disagreed and, in general, suggested a higher fee. The mean fee suggested by the "disagree" group was \$3.82. We recommend that the BLM study the feasibility of establishing a higher fee in ACW, particularly if the revenues would be funneled back into the wilderness area. Fees could be used in conjunction with the use limit to ration opportunities to visit ACW.<sup>4</sup> See Stankey and Baden (1977), Stankey and Schreyer (1987), and Cole, Petersen, and Lucas (1987) for discussions on the use of fees in rationing wilderness visitation.

*To the extent allowed  
by BLM policy,  
fees could be used to  
ration visitation.*

**Information and Education.** The BLM currently attempts to inform and educate its visitors through materials mailed with each permit, through signs at each trailhead, through its rangers, and through the receptionist at the Safford office. Our research demonstrated that most these sources were significantly used by the respondents in preparing for a trip. We could not, however, estimate how effective these materials were in changing behaviors or attitudes.

The research results and comments from respondents indicate that some important messages are not getting across. Many visitors improperly dispose of their wastes. A significant number of people show up on site unprepared for what they are about to encounter and have difficulty navigating their way through the wilderness area. Other problems have been pointed out in this report.

Based on qualitative observations, we are confident that messages delivered by the rangers and the receptionist were received and listened to by the respondents. We strongly recommend that these important sources of information and education be continued in the future. We are less confident that signs and other written materials were as effective. Accordingly, we recommend that the BLM analyze its signage program and its written materials to determine if modifications could be made to better deliver important messages to their intended audience. For example, the signs and brochures could possibly be re-designed to be more attractive to the visitors (and thus more likely to be read). The analysis should take into account the characteristics of the visitor population, its educational levels, and the motives of its members for visiting ACW.

We also recommend that the BLM analyze its goals for providing information and education. As noted by many authors, informational and educational programs can accomplish numerous purposes, such as redistributing use of the wilderness, modifying visitor expectations, encouraging minimum impact behaviors, and developing wilderness ethics (Brown, McCool, and Manfredo 1987; Cole, Petersen, and Lucas 1987; and Stankey and Schreyer 1987). We have mentioned above a few instances where information and education could be used to change behaviors and attitudes.

Needless to say, however, past efforts by the BLM to inform and educate its visitors are laudatory. Techniques such as the booklet describing the wilderness area, the mileage map, and educational brochures on minimum impact behavior mailed with each permit have certainly made positive impacts. Our suggestions are provided as refinements of an essentially sound system.

*Modifications of current  
signs and brochures  
could make them more  
attractive to visitors.*



## MONITORING

An essential step of any management system (for example the limits of acceptable change system for wilderness management planning [Stankey et al. 1985]) is monitoring. Consequently, our final recommendation to the BLM is to monitor, on a periodic basis, sociological conditions at ACW.

**SHORT-TERM MONITORING** We recommended in sections above that standards should be developed for various attributes of the recreational setting. The BLM should conduct annual or biannual surveys to determine whether or not the standards are being met. A short survey could be administered to group leaders as they exit the wilderness area. We suggest that a heavy use period, such as a few weekends during the spring, be selected for administration of the survey. In addition to demographic questions as the agency deems necessary, the main body of the questionnaire could be formatted as in figure 1. Response categories (e.g. 0 times, 1-2 times, etc.) could be inserted as appropriate (given the standards established by the agency). Respondents would be requested to complete this question for each zone of the wilderness area (corridor, side canyon, and rimlands).

By collecting a reasonable number of responses, for example 100, the agency could determine whether standards were being exceeded and the probability of exceedence for any visitor party.

**Figure One**  
**Annual Monitoring Survey**  
**Canyon Corridor Zone**

How many encounters with the following groups and conditions <u>in the main canyon</u> did you have during your trip?	
GROUP OR CONDITION	NUMBER OF ENCOUNTERS
Small groups (1-3 people)	
Medium-sized groups (4-6 people)	
Large groups (7 or more people)	
Horseback riders	
Nude bathers	
Hunters	
Damaged trees or other vegetation	
Manure from livestock	
Litter	
Human feces or toilet paper on the ground	

**LONG-TERM MONITORING** In addition to short-term monitoring, the BLM should conduct extensive re-surveys of the visitor population. The purpose of these surveys would be to detect trends in demographic characteristics and changes in the standards and perceptions of the population. We recommend that these surveys be conducted every ten years by a professional in survey research. As with the short term surveys, three questions based on figure 1 should be included in the questionnaire in addition to the following questions from the mail survey (appendix 1): 1, 6, 7, 8, 9, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 35, 36, 44, 45, 51, 52, 53, 54, and 58.

## APPLICATION TO OTHER BLM WILDERNESS AREAS

As of 1985, the BLM managed 368,658 acres of wilderness in 24 congressionally designated areas (Wilderness Institute 1985). These figures will greatly increase in the next few years. In this section, we evaluate the extent to which the research approach outlined in this report and the managerial program implemented at ACW could be exported to other wilderness areas under the control of the BLM.

**RESEARCH APPROACH** Many aspects of our research approach could easily be transferred to other settings. The theoretical framework outlined in chapter 1, which uses a production model of Brown (1984), applies to management of any recreational setting. So does the theory of attribute management, which is the foundation of the recreational opportunity spectrum concept (Clark and Stankey 1979; McCool, Stankey, and Clark 1985). The normative approach to analyzing social carrying capacities, embodied in our development of contact preference standards for ACW, is described in detail in Shelby and Heberlein (1986). This approach is also applicable to any wildland setting. Finally, the designation of opportunity zones or classes--as in our designation of the corridor, side canyon, and rimland zones in ACW--is the basis of the limits of acceptable change system (Stankey et al. 1985). This system was designed to apply to all components of the National Wilderness Preservation System.

With care, the questionnaire could be adapted to other wildernesses. Each area has individual qualities to be addressed in survey research, consequently, individual items would have to be "custom tailored" to the specific setting. We would also suggest an even greater emphasis on experience-based management than was used in our questionnaire. Discussions on this approach to recreation research may be found in Brown (1983) and Driver, Nash, and Haas (1987).

Also, with extreme care, the results of this research could be applied in other areas. Our research has uncovered some interesting findings that could be useful to managers grappling with issues similar to those found in ACW. As cautioned in chapter 2, though, statistically, our results only apply to the population of people who had obtained permits to visit ACW. Managers and researchers extrapolating from our research to other settings should first determine how similar their populations are to the Aravaipa population.

**MANAGERIAL PROGRAM** Aravaipa Canyon Wilderness provides a model of successful implementation of a rigorous management program. It appears to be accomplishing its objectives of preserving the wilderness environment while providing high quality opportunities for recreational visitors. The program is also strongly endorsed by its recreational constituency.

The mix of managerial techniques employed at ACW could be transferred to other areas given two qualifications. First, the need for the program should exist and the visitor population should recognize the need. ACW's visitors regard it highly as a scenic and wildlife preserve. Consequently, they are very willing to submit to regulations that at least appear to help preserve the setting. Managers of wilderness areas where the visitor population does not recognize the need for control will face some controversy in imposing Aravaipa's program. Second, Aravaipa, with only two viable access points to the wilderness, is uniquely situated for managerial control. Rangers stationed at each end of the wilderness have a remarkable degree of contact with visitors. Consequently, management can maintain the high profile that is necessary to ensure compliance with the restrictions and limitations imposed on ACW. Other wilderness areas with multiple access points may encounter difficulty in implementing programs as simple as a daily use fee.

Acknowledging these qualifications, Aravaipa is a model of wilderness management success in the Bureau of Land Management system.

*Aravaipa Canyon  
Wilderness provides a  
model of successful  
implementation of a  
rigorous management  
program*

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## ENDNOTES

1. Question 1, see appendix 1.
2. Question 58, see appendix 1.
3. As noted in chapter 6, the BLM has already taken some steps to improve signage at the west trailhead.
4. BLM policy, which limits the amount of fees that can be charged for recreation (Federal Register 1984:5300), however, thus limits the extent to which fees can be used to ration visitation.



# 1. INTRODUCTION

In 1984, when Congress set aside the 6,699 acres<sup>1</sup> that constitute Aravaipa Canyon Wilderness (P.L. 98-406), it required the Bureau of Land Management to provide a setting in which a specific kind of recreation can take place. Wilderness recreation, as it is referred to by natural resource managers and scientists, is typically viewed as taking place in a setting with few other people; no mechanized equipment; pristine, rustic surroundings; spectacular scenery; abundant wildlife; and attendant risks and challenges. Although many cultural definitions and implications can be attached to wilderness and wilderness recreation, our purpose in conducting this study was to determine, from a sociological point of view, whether recreational visitors to Aravaipa Canyon Wilderness (ACW) are experiencing “wilderness” as defined by federal law and policy. Therefore, our role as researchers was to help the Bureau of Land Management (BLM) accomplish its newly mandated responsibilities.

We fulfilled our role by administering a questionnaire survey to 800 visitors and potential visitors of ACW during 1987 and 1988, by conducting on-site interviews with visitors during 1988, and by analyzing the results. This report is the complete synthesis of our research.

## THEORETICAL FRAMEWORK

**DEFINING THE WILDERNESS RECREATION PRODUCT** Wilderness is formally defined in the Wilderness Act of 1964 (P.L. 88-577, sec. 2c):

*A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man is a visitor who does not remain. An area of wilderness is further defined to mean in this Act as an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation;...and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.*

*The Wilderness Act of 1964, the Arizona Wilderness Act of 1984, and BLM policy define the recreation product to be produced at Aravaipa Canyon Wilderness.*

The Arizona Wilderness Act of 1984 (P.L. 98-406, sec 201) defines the features that warranted the inclusion of Aravaipa Canyon into the National Wilderness Preservation System:

*(1) Aravaipa Canyon, situated in the Galiuro Mountains in the Sonoran desert region of southern Arizona, is a primitive place of great natural beauty that, due to the rare presence of a perennial stream, supports an extraordinary abundance and diversity of native plant, fish, and wildlife, making it a resource of national significance and*

*(2)...[has] great scenic, geologic, and historical values...*

Policy statements of the Bureau of Land Management define management of wilderness in terms of preserving wilderness character and providing benefits to society (U.S. Bureau of Land Management 1981). Wilderness character, according to BLM policy, derives from the naturalness of the setting, opportunities for solitude, opportunities for primitive and unconfined kinds of recreation, and special features, such as ecological, geological, and historical features.

These broad statements of public value describe the recreation environment that should greet visitors to Aravaipa Canyon Wilderness. It should appear to be untrammelled by human activity, undeveloped, primeval, without permanent developments, and affected primarily by the forces of



nature. Visitors should feel solitude. They should also engage in primitive kinds of travel and, possibly, subsistence behavior, and feel unconfined and free. In the special case of Aravaipa Canyon Wilderness, they should perceive great natural beauty, enjoy the delights of a perennial stream in the desert, observe an extraordinary abundance and diversity of native plant, fish, and wildlife, and have opportunities to study its geologic and historical features.

Such is the recreation product that Congress and the Bureau of Land Management have promised to deliver to the American public. In our report, we assume that Aravaipa Canyon Wilderness is just that--a product to be offered to recreation consumers much as museums and symphonies are marketed to patrons of the fine arts. We use this strategy not to denigrate the importance of Aravaipa Canyon, but to objectively scrutinize how its characteristics are perceived by visitors in terms of its purpose as a wilderness recreation resource.

**PRODUCTION OF RECREATION EXPERIENCES** As a format for organizing our results and as a framework for understanding recreation theory, we use the production approach proposed by Brown (1984). This approach asserts that recreation experiences result from a production process in which the wilderness visitor converts various inputs into experiences through recreation behavior. The process starts with a piece of land, for example, Aravaipa Canyon Wilderness when it was first designated. Land has numerous characteristics (e.g. scenery, water, trees, etc.) that make it attractive or unattractive for particular forms of recreation. In the vernacular of marketers, these characteristics are termed product attributes (Kotler 1980).

*Recreation experiences result from a production process in which the visitor converts inputs into experiences.*

All of the attributes of an area, taken together, comprise the recreation setting. The setting is the environment in which people pursue recreation experiences. Many theorists have grouped the attributes of a single recreation setting into three subcategories: social setting, managerial setting, and physical/biological setting (Clark and Stankey 1979; Haas, Driver, and Brown 1980a; Brown 1984; Clark and Stankey 1985; McCool, Stankey, and Clark 1985). Attributes in the social setting include all of the interactions one can have with other people while visiting a wilderness area. Examples of interactions are greeting and sharing information with other people while hiking on a trail, watching a climber ascend a rock wall, observing people camped near one's campsite, or even just hearing people's voices who may be out of sight. The managerial setting includes attributes related to actions taken by managers to influence recreation behavior. Use limits, ranger patrols, prohibitions on fires or pets, trails, and toilets name a few of the attributes management can introduce into a wilderness area. Finally, the physical and biological setting consists of tangible, non-social attributes such as scenery, water, and wildlife. Included in our definition of the physical/biological setting are "artifacts" of recreational use--litter, fire rings, graffiti, pack stock manure, etc.--and human presence for non-recreational purposes--for example, overflights by aircraft.

Through their activities, managers can manipulate the attributes of a wilderness area and thus change the settings in which people recreate. By building trails and other facilities, cleaning up litter, breaking down fire rings, and managing wildlife populations, for example, managers change the physical/biological setting. By limiting visitation, group sizes, and durations of visits; charging fees that exclude some visitors; and regulating behavior (such as horse use), managers alter the social setting of the wilderness area. And, by imposing rules and regulations, conducting ranger patrols, and requiring permits and reservations, managers introduce regimentation into the managerial setting (Lime 1974).

Logically, a person can have an experience only if the opportunity presents itself. For example, a solitude experience is only likely to be achieved if one can find a setting without people. Therefore, settings determine the opportunities that will be available for certain kinds of recreation experiences (Clark and Stankey 1979; Haas, Driver, and Brown 1980a; Brown 1984; Clark and Stankey 1985; McCool, Stankey, and Clark 1985). Because settings are bundles of attributes, "attributes...at least influence, if not control, the kinds of experiences that recreationists are able to obtain" (McCool, Stankey, and Clark 1985:2). Theoretically, then, changes in attributes in any of the three settings should influence how a visitor experiences a wilderness area.

*A person can have an experience only if the opportunity presents itself... settings determine the opportunities that will be available...*

Visitors come to wilderness to derive a variety of experiences and benefits (Wagar 1964; Hendee 1974; Brown and Haas 1980; Haas, Driver, and Brown 1980a; Haas, Driver, and Brown 1980b; Brown 1983; Driver, Nash, and Haas 1987), any of which could be influenced by changes in setting attributes. Of all of the recreation experiences obtained by wilderness visitors, influences of changes in setting attributes on feelings of crowding and satisfaction have been studied most extensively. Most of this research has focused on attributes of the social setting; the relationship between social interactions and feelings of crowding or satisfaction has been studied in depth for over twenty years (Graefe, Vaske, and Kuss 1984). Some researchers have broadened the focus to include factors from the physical/biological setting. Peterson (1974), for example, delimited attributes that produce satisfaction and dissatisfaction at the Boundary Waters Canoe Area; Bultena, et al. (1981) compared perceived crowding at Mt. McKinley National Park with a measure of nonsocial human impacts; Vaske, Graefe, and Dempster (1982) found that an index of environmental disturbance influenced perceived crowding more than social measures; and Connelly, Brown, and Wilkins (1986) identified three critical factors that influence total satisfaction of recreation visitors in Adirondack Park.

Other writers have proposed and researched links between changes in setting attributes and experiences other than crowding or total satisfaction. Wagar (1964) hypothesized that 12 types of wilderness experiences would be differentially affected by setting changes wrought by increasing numbers of visitors in a park. Lee (1975) used multiple linear regression to investigate the influence of environmental and social variables on four dependent variables (overall satisfaction, social satisfaction, environmental satisfaction, and crowding). Finally, the tie between setting attributes and recreation choice behavior has been researched by Cordell and James (1972) and was the subject of a symposium in 1984 (Stankey and McCool 1985). Two of the papers presented in the symposium addressed the importance of managerial setting attributes in people's choices of recreation areas (Beaulieu and Schreyer 1985; Watson and Roggenbuck 1985).

A final link to be discussed in our model of recreation experience production involves characteristics of the consumer of recreation opportunities (otherwise known as the visitor). Characteristics of the consumer determine how a recreation product is perceived, how it is consumed, and what experiences are produced (Kotler 1980; Brown 1983). Relevant characteristics include age, gender, race, social status, residence, education, previous experience in the specific recreation setting being studied, previous experience in similar settings, membership in organizations that focus on conservation issues, etc. These characteristics indicate, to a degree, the kinds of experiences that people have been exposed to during their lifetimes (i.e. how they have been socialized) and what kinds of perspectives they bring to a recreation environment.<sup>2</sup> Because visitors' perspectives color how they interpret and respond to events in life, they are important variables to consider when examining the influence of setting attributes on recreational experiences. People with divergent perspectives on life may be affected differently by attributes they encounter in a recreation setting.

*Characteristics of the consumer determine how a recreation product is perceived, how it is consumed, and what experiences are produced.*

**LIMITS OF ACCEPTABLE CHANGE** Attributes that influence recreation experiences are useful as indicators of the quality of recreation settings. Indicators help managers focus their attention on aspects of the wilderness environment that are important to visitors. Indicators serve as proxies for experiences, such as solitude, that are difficult and costly to measure. For example, if research determines that solitude on a hiking trail is strongly affected by contacts with others, social contacts would be a good indicator of trail solitude--they are easily monitored by wilderness managers and can be measured in a cost effective way.

From indicators managers can establish standards for wilderness management. Standards are quantitative expressions of indicators that spell out exactly how much of an attribute will be present in the setting. They also "provide a base against which a particular condition can be judged as acceptable or not" (Stankey et al. 1985:12). An example of a standard for social contact in a wilderness area is "two contacts with other groups per day". If visitors encounter three or more groups per day, they are experiencing unacceptable levels of contact and, presumably, not experiencing acceptable levels of solitude. Clearly, standards must relate to the recreational experiences of visitors.



Another term for a standard is “limit of acceptable change” or, simply, LAC (Stankey et al. 1985). The term LAC underscores the notion that attributes (and by extension, experiences) can be allowed to vary between bounds established by management. For example, “pure” solitude, defined by a total lack of human interaction, obviously cannot be produced in a wilderness area unless visitation were limited to one person. As soon as more than one person enters the area, the potential for experiencing solitude is diminished to a degree. The challenge for management is to establish an LAC for solitude that keeps the experience within reasonable bounds for a wilderness area. Analogously, appropriate LAC’s can be developed for other types of wilderness recreation experiences.

*This report is designed to assist the Safford District in developing LAC’s for Aravaipa Canyon Wilderness.*

In cases where visitor use is having, or is expected to have unacceptable impacts, determination of LAC’s for wilderness areas is recommended by BLM policy (U.S. Bureau of Land Management 1983; Mahoney 1989). The Safford District of the BLM has signaled its intent to comply with agency policy in its recently published management plan for Aravaipa Canyon Wilderness (U.S. Bureau of Land Management 1988). This report is designed to assist the Safford District in developing limits of acceptable change for social, managerial, and biological attributes in ACW as they relate to the production of recreation opportunities. We must note at this juncture, however, that the analyses and recommendations contained in this report are not a substitute for management discretion. Our role is to provide information for management decision making.<sup>3</sup> This report should be only one input into the process of establishing limits of acceptable change for Aravaipa Canyon Wilderness.

## OBJECTIVES OF THE STUDY

Six objectives guided our research (Moore and Brickler 1987, p. 13):

1. Analyze the demographics, personal characteristics, wilderness values, social behavior patterns, use purposes, and use patterns of on-site visitors; their perceptions of, expectations and preferences for, and satisfactions derived from the social, biological, and physical attributes of the recreation setting.
2. Analyze the demographics, personal characteristics, wilderness values, use purposes, and perceptions of potential visitors.
3. Analyze the interplay of social, environmental, administrative, spatial, and temporal variables; and the individual and collective influences of these variables on the recreation experiences derived by on-site visitors.
4. Analyze the influence of social, environmental, administrative, and temporal variables on the recreation choices of potential visitors.
5. Identify standards of quality held by sub-populations of on-site and potential visitors regarding attributes of the recreation setting.
6. Develop alternative management strategies to maintain or improve the quality of visitors’ recreation experiences.

These objectives provided our research with a structure for exploring the influence of setting attributes on recreation experiences at Aravaipa Canyon Wilderness.

## FORMAT OF THE REPORT

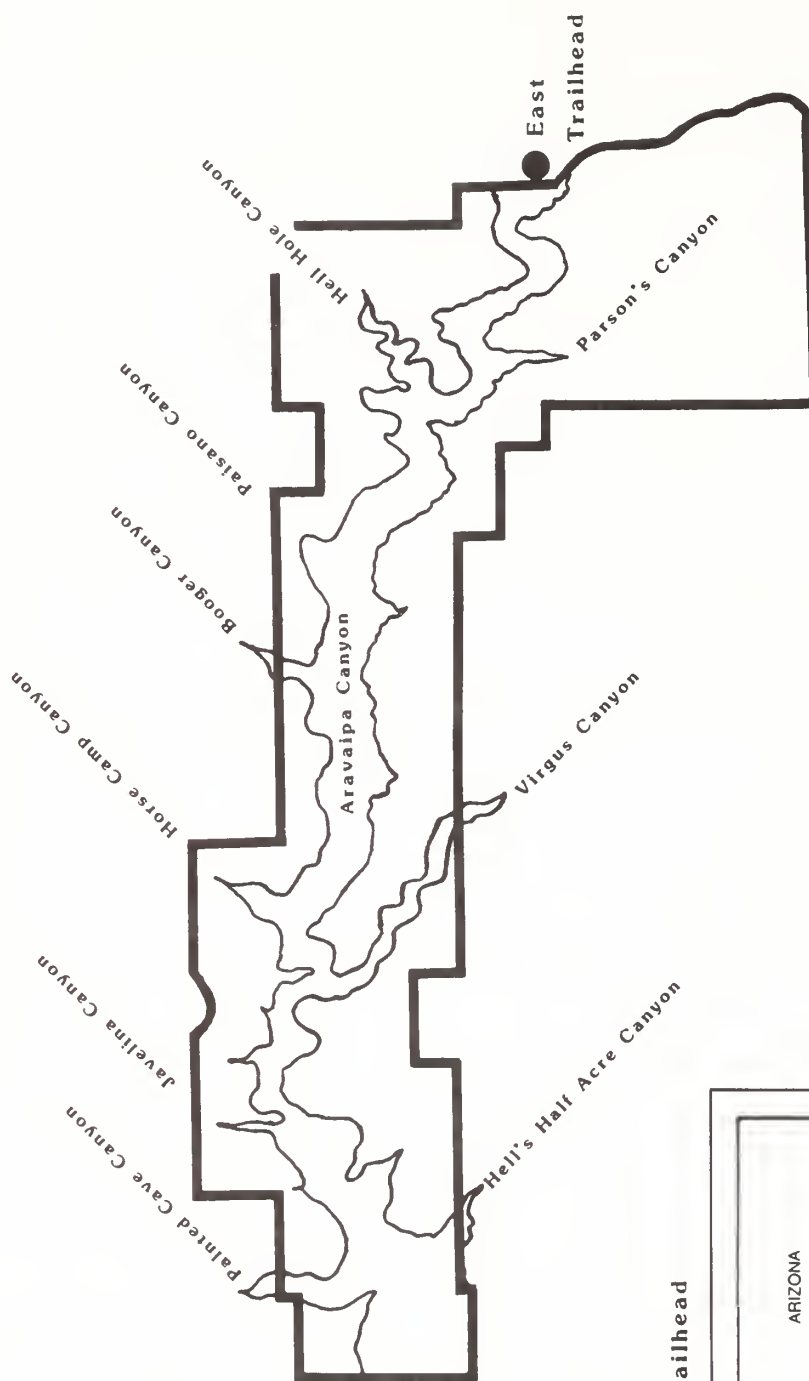
Three chapters form the core of this report: chapter 4, Social Setting; chapter 5, Physical/Biological Setting; and chapter 6, Managerial Setting. In these chapters we present the essence of our research on setting attributes and recreation experiences. Before the core chapters, in chapter 3, we discuss research and analyses regarding the social carrying capacity limit at Aravaipa Canyon

Wilderness. This discussion is separated from the social setting chapter because one of the basic purposes of our research was to evaluate the current visitation limit in place at Aravaipa. Before proceeding to these chapters, we first describe Aravaipa Canyon Wilderness and detail our research methods.<sup>4</sup>

## ENDNOTES

1. In the act (P.L. 98-406), 6,670 acres were dedicated to wilderness. Boundary surveys added the additional 29 acres (U.S. Bureau of Land Management 1988).
2. Theoretically, socialization processes, as do other circumstances of life (for example, stage in the life cycle), influence one's self-concept, outlook on the world, and behavior patterns (Burch 1966; Burch 1969; Cheek and Burch 1976; Rosenburg and Turner 1981; Rosenberg and Kaplan 1982). People thus develop cognitive, mental filters that help them interpret meanings from life events (such as visits to recreation settings)
3. See Stankey (1979), Burch (1984), and Moore and Brickler (1987) for discussions of the role of social researchers in wilderness management decisions.
4. The entire report is summarized and the management recommendations are presented in the Research Summary (pages 13-21).

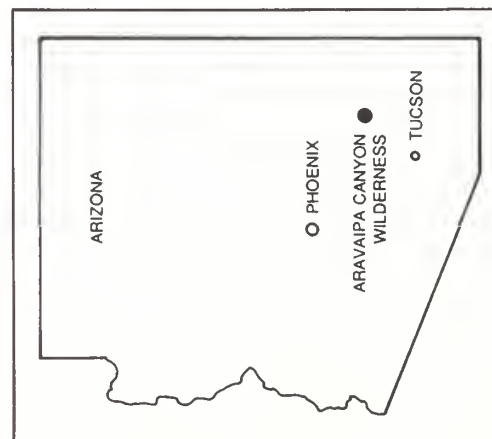
# ARAIPA CANYON WILDERNESS



— = Wilderness Boundary

Scale in Miles  
1 2 3

West Trailhead





## 2. STUDY AREA AND RESEARCH METHODS

### ARAVAIPA CANYON WILDERNESS

*Aravaipa is an Apache name (some say Pima, some say Papago) and the commonly accepted meaning is "laughing waters." The name fits. (Abbey 1982:155)*

The main feature of Aravaipa Canyon Wilderness--Aravaipa Creek--is a relic. Perennial desert streams are not easy to find in southern Arizona any more, most have been sacrificed to quench the thirsts of agriculture and urban growth.<sup>1</sup> But Aravaipa Creek still flows, and it supports a gentle, verdant riparian oasis. Seven native fish species--small fish with names like loachminnow, spikedace, and Sonoran sucker (Bureau of Land Management 1988)--inhabit the creek. They seek food and shelter among boulders and mats of watercress, darting about when hikers' feet intrude into their watery sanctuary. Aravaipa Creek is one of the few remaining places where such fish can still exist. Lining the banks of the creek are mature and renewing stands of cottonwood, Arizona walnut, alder, willow, mesquite and box elder. These trees provide cooling shade and habitat for some of the more than 200 species of birds that reside in the wilderness area.

Rising starkly from the oasis are the walls of Aravaipa Canyon. Composed of red-hued welded tuffs, conglomerates, and metamorphic rock sculpted by wind and water into precipitous cliffs, spires, natural windows and other forms, the canyon walls tower 600 feet or more over the canyon floor. Where rocky terraces and talus slopes occur, desert plants and animals exist. There, among the saguaro, ocotillo, barrel cactus, cholla, palo verde, and prickly pear, may be found desert bighorn sheep, coatimundi, javelina, and other desert animals.

Nine major side canyons branch from Aravaipa Canyon, adding another dimension to the wilderness. Sheltering streams, frigid deep pools, springs, waterfalls, wildflowers, and hanging gardens of ferns, most of the side canyons extend the benign quality of Aravaipa Canyon. They offer protected environs for the canyon's noteworthy raptors (including eagles, blackhawks, and peregrine falcons), its amphibious species (such as the canyon tree frog), and, of course, its more adventurous human visitors.

If one takes the time to climb out of the Aravaipa Canyon through the side canyons or on a few other trails, he or she is treated to the rugged rim country. Stretching out beyond the north and south boundaries of the wilderness area, is a vast, arid wildland area subdivided by numerous small gorges and arroyos. Devoid of water--save a few cattle ponds, wildlife waters, and tinajas--the rimlands stand in sharp contrast to the riparian-based features of the wilderness area.

Because of its natural richness and diversity, ACW has long been popular with people. They come to escape the heat of desert cities, hike, explore, camp, swim, watch wildlife, or even hunt. Between 1974 and 1986, 43,708 people visited the area, spending more than 111,000 visitor days (table 1). During the peak year of 1982, 14,072 visitor days were spent by 4,490 visitors. In "average" years, 3,362 people visit ACW, accumulating 8,568 visitor-days. Although Arizona's climate permits year 'round access, most visitation occurs during the spring and fall, when temperatures are more moderate (figure 2).

The floor of Aravaipa Canyon, a narrow ribbon rarely wider than 320 feet<sup>2</sup> (Minckley 1981) and 11 miles long in the wilderness area, accommodates nearly all of this recreational use. Visitors ply

**TABLE 1.**  
**Aravaipa Canyon Visitor Use<sup>1</sup>**

YEAR	VISITOR DAYS	VISITORS
1974	6,232	3,116
1975	5,240	2,260
1976	7,456	3,737
1977	9,620	4,061
1978	8,053	3,238
1979	7,861	3,301
1980	10,089	3,597
1981	2,189	4,215
1982	4,072	4,940
1983	8,300	2,890
1984	5,865	2,091
1985	7,980	2,854
1986	8,430	3,048
<b>TOTAL:</b>	<b>111,387</b>	<b>43,348</b>

<sup>1</sup> (U.S. Bureau of Land Management 1988)

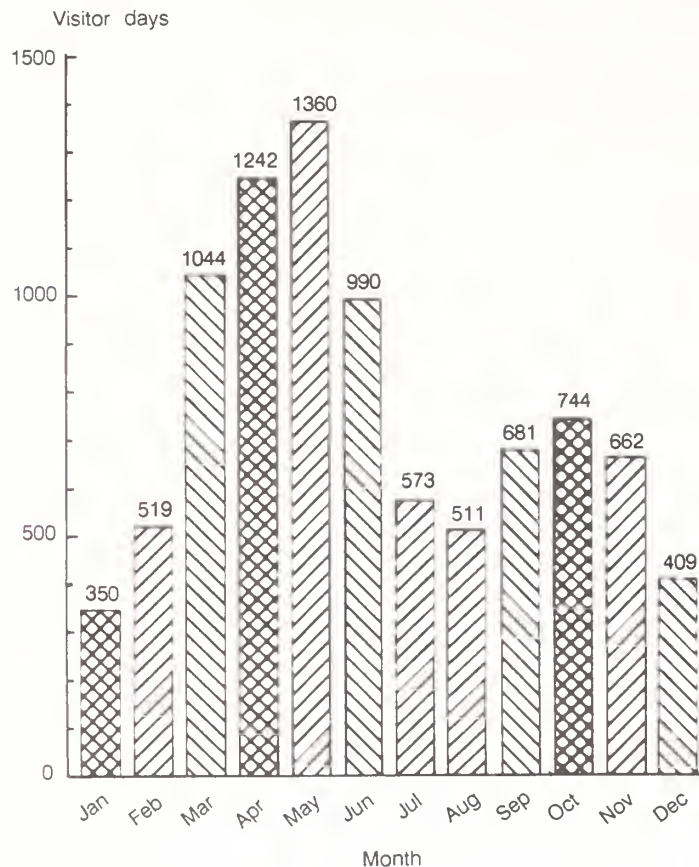


FIGURE 2  
Average visitation by month, 1976-1986:  
Aravaipa Canyon Wilderness

ACW by hiking across the beaches, dunes, rock piles, grassy flats, and mesquite bosques that occur at the numerous meanders of Aravaipa Creek. Other travel routes are impractical: the canyon's walls prevent most visitors from wandering far from the creek. Even the side canyons, many of which are choked with boulder jams and brush, do not offer easy travel routes. On the dry lands near the creek, overnight visitors find a limited number of suitable campsites, and most of these sites are immediately adjacent to or part of hiking paths.

Consequently, most recreational activity takes place on the floor of the main canyon, which comprises only a small fraction of Aravaipa's 6,699 acres. There, social interactions and exposure to the effects of recreational use (e.g. litter, firerings, trails, etc.) are relatively common. In contrast, in the side canyons and on the rimlands exist recreation settings relatively devoid of human interaction and resource impacts. One of our tasks in conducting research at ACW was to examine how visitors were influenced by conditions in the main canyon and to what extent they used other parts of the wilderness area as alternatives. In succeeding chapters we discuss how we executed this task and accomplished the other research objectives (see chapter 1).

## RESEARCH METHODS

To accomplish our objectives, we collected data during 1987 and 1988. Two data collection techniques were used: a mail questionnaire survey and on-site administration of a "picture questionnaire".

**MAIL QUESTIONNAIRE SURVEY** An 18 page questionnaire (appendix 1) was mailed to approximately 800 people who obtained permits to visit ACW between 1 March 1987 and 28 February 1988. Consisting of 58 questions, it was a long questionnaire, but its length had little, if any, effect on our respondents' willingness to participate in the study. An overall 83% response rate to the survey was achieved.

The questionnaire contained a variety of response formats, including open-ended questions, close-ended questions, and combinations of the two formats. A cognitive mapping question (question 23, see appendix 1), where visitors were asked to trace their travel routes through ACW, was also included. Most of the questions used discrete responses, Likert-type scales, and preference rankings. The questionnaire was designed and constructed according to the Dillman (1978) method.

Respondents were selected from monthly sampling frames provided by the Bureau of Land Management. At the beginning of each month for one year, the Safford District office sent us a list of names and addresses of people who had requested and received permits to visit ACW during the previous month. The list included people who had obtained permits on-site from the rangers or from Aravaipa College (a community college near the west end of the wilderness area). Because not all

permit holders actually visited ACW, we surveyed visitors and “no-shows”. (Our questionnaire was designed to survey both populations.)

Immediately after receiving each list, we selected a random sample<sup>3</sup> of permit holders and mailed questionnaires to them. Consequently, potential respondents received questionnaires within two to six weeks of their prospective trips. We used this procedure to minimize the memory lapses that might occur between the end of a visit and receipt of the questionnaire.<sup>4</sup>

Specific numbers of permit holders were sampled each month (table 2). The size of each month's sample was based on a proportion of the predicted size of the total sampling frame. Based on visitation records provided by the BLM, Safford District Office (U.S. Bureau of Land Management 1987), we predicted the size of each month's sampling frame and, by summing the individual frames, the total number of permits that would be issued during our sampling period. Because our required sample consisted of 800<sup>5</sup> out of a sampling frame predicted to consist of 1,000 permit holders, we developed a sampling plan in which 80% of each month's permit holders would be mailed a questionnaire. In this manner, we planned to select a proportionate, stratified random sample of permit holders.

According to our sampling scheme, each permit holder was to have an equal probability of being mailed a questionnaire. Equal probability of selection allows combination of the monthly strata into a single data set and permits comparisons between the strata. But because our predicted sampling frames varied from actual numbers of permits issued, each month's sample had a different probability of being selected. For example, respondents in the May cohort had a different probability of being sampled than permit holders in the June cohort. To give each cohort (and correspondingly, respondent) an equal chance of being in the total data set, weighting factors were derived (table 2)<sup>6</sup> and used in all analyses. (Consequently, in later tables where observed frequencies are presented, they most often are not whole numbers.)

The sample, as selected, is representative of the population who requested permits to visit ACW during our sampling period. There are two principal threats to its generalizability. (“Generalizability” refers to how well the sample represents potential users of ACW and wilderness visitors in general.) First, not all permit holders actually visited ACW. We feel that these “no-shows” may have been less motivated to respond to our survey than visitors. Consequently, to an undetermined extent, non-response rates may differ between visitors and no-shows.

In later chapters, though, we cite many instances where visitors and no-shows were statistically identical on many variables. Therefore, if differential non-response did occur, it probably did not affect the representativeness of the sample. Second, our sampling frames consisted of permit holders, not all visitors. As a result, our sample could be subject to group representative bias (Holland, Fedler, and Ditton 1986). Permit holders are self-selected group leaders and their opinions and demographic characteristics may be different from those of the general population. Holland, Fedler, and Ditton (1986) found no such bias in their research. Regardless, because of the possibility of group representative bias, we qualify that our sample is only truly representative of the permit holder population.

**TABLE 2**  
Questionnaires mailed, completed questionnaires, permits issued,  
and weighting factors for each month of the survey

MONTH	QUESTIONNAIRES MAILED	COMPLETED QUESTIONNAIRES	PERMITS ISSUED	WEIGHTING FACTORS
MARCH, 1987	86	68	180	1.49
APRIL	100	82	176	1.21
MAY	116	102	160	0.89
JUNE	79	67	80	0.67
JULY	61	51	69	0.98
AUGUST	48	38	70	1.04
SEPTEMBER	54	44	76	0.98
OCTOBER	68	61	103	0.95
NOVEMBER	60	49	97	1.12
DECEMBER	40	32	54	0.95
JANUARY, 1988	36	31	42	0.76
FEBRUARY	48	40	71	1.00
	796	665	1,178	

<sup>1</sup>The weighting factors adjust for differential response rates in addition to differences between predicted and actual numbers of permits issued. After these adjustments, each respondent has a .56 probability of being included in the final sample.



To a limited extent, the sample is also representative of permit holders in any given year and wilderness users in general. But because many factors influence who will obtain permits to visit ACW, care should be taken in generalizing these results to other years and other wilderness areas.

Mailings were conducted according to procedures in Dillman (1978). Mailing labels were produced from our data base system; first-class postage stamps were affixed on the mail-out envelopes; return envelopes had a business reply permit; and code numbers assigned to permit holders were written by hand on the questionnaires.

A permit holder, depending upon his or her promptness in responding, was sent up to four mailings<sup>7</sup>:

1. *First mailing:* A questionnaire, cover letter explaining the study, and a return envelope were mailed to each respondent.
2. *Second mailing:* One week after the first mailing, a postcard was sent to all members of our sample. The card thanked those members who had responded and encouraged those who had not.
3. *Third mailing:* Three weeks after the first mailing, a reminder letter and a replacement questionnaire were sent to all non-respondents.
4. *Fourth mailing:* Seven weeks after the first mailing, a reminder letter and a replacement questionnaire were sent to all non-respondents.

See appendix 1 for copies of all questionnaire materials.

The mail questionnaire was pre-tested in March, 1987 by a panel of 20 Tucson residents. The panel included people who had and had not visited Aravaipa Canyon Wilderness. They were selected to represent a broad array of potential respondents to the actual survey. Pursuant to the method described in Dillman (1978), we interacted with the pre-test respondents as they filled in the questionnaire. The time required to complete the questionnaire, any difficulties in filling it out, consistency in response to questions, respondent's evaluation of the completeness of response categories, and perceived bias in question wording were noted. The feedback generated from this process was used to revise the questionnaire into its final format.

Only one problem was encountered in administering the questionnaire. After receiving our first returns, we noted that many respondents had provided unlikely responses to question 30 (see appendix 1 for the text of the question). Specifically, they indicated that they had encountered less human feces, litter, damaged trees, etc. than they prefer. Because these people had responded in good faith to the rest of the questionnaire, we decided that they did not have malicious intent. They were apparently confusing the scale on question 30 with similarly appearing scales on questions two and three. (The scales on questions two and three allowed a range of responses from "strongly dislike" to "strongly like". The scale on question 30 ranged from "a lot less than I prefer" to "a lot more than I prefer".) To draw attention to the scale on question 30, we first highlighted it with fluorescent ink. After conducting a few mailings with this technique, we determined that highlighting was not having any effect.

We then began inserting a small slip of paper into each questionnaire that explained question 30 in more detail (see appendix 1 for a copy of the slip). The slip was inserted so that the respondent would have to remove it before responding to question 30. "Incorrect" responses to the question dropped substantially after we began inserting the slips. In all analyses that involved question 30, cases were deleted if the respondent indicated that they saw less or a lot less human feces than they prefer.<sup>8</sup> Approximately 60 cases were deleted for these analyses.

### 3. EVALUATION OF THE USE LIMIT

In 1973, to protect the recreation setting at Aravaipa Canyon Wilderness, the Bureau of Land Management began to restrict visitation (U.S. Bureau of Land Management 1988). Since that time, no more than 50 persons per day have been allowed in the wilderness area.<sup>1</sup> The purpose of this chapter is to evaluate whether this use limit is accomplishing its intended objective of preserving wilderness recreation opportunities for Aravaipa's visitors.

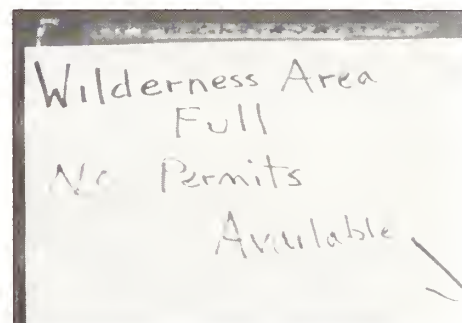
In this chapter, we describe the social and psychological consequences of changing the current use limit.<sup>2</sup> First, we document that social contacts in the wilderness area can have detrimental effects on attainment of certain kinds of wilderness experiences. Then, we demonstrate that numbers of social contacts are related to use levels in the wilderness area. This analysis shows that a use limit is a viable management tool in regulating the social impacts of recreational visitation. Finally, we establish a social contact standard for Aravaipa Canyon and predict the probability that the standard will be exceeded under various use levels. (Note that the standard identified in this chapter only refers to the canyon corridor of the wilderness area. See chapter 5 for a description of the corridor.)

#### SOCIAL CONTACTS AND SOCIAL IMPACTS

Implicit in use restrictions is the assumption that social contacts and other indications of recreational use (e.g. litter, firerings, etc.) have detrimental effects on visitors' enjoyment of wilderness recreation experiences. But if social impacts cannot be related to densities of recreational use, use limits are ineffective and inappropriate (Shelby and Heberlein 1986). Accordingly, in evaluating the use limit at ACW, we first examined the tie between recreational use and social impact.

We found that attainment of four of eight types of wilderness recreation experiences at ACW was negatively influenced by social contacts.<sup>3</sup> Feelings of solitude, freedom and unspoiled wilderness, in addition to the feeling that no one had been in the wilderness before, tended to decrease as visitors encountered greater numbers of groups (table 1). The association was particularly strong for solitude. An odds ratio of 0.63 for a loglinear, uniform association model (Clogg and Shockey 1988) indicates that seeing 1-2 rather than 0 groups during a wilderness visit decreases the odds of having a strong (as opposed to moderate) feeling of solitude by 37%.

Attributes of the recreation setting other than social contacts can affect realization of recreational experiences. As we show in chapter 5, litter and human wastes also have powerful effects. But in this chapter, we focus solely on the effects of social contacts. We do this for three reasons: (1) social contacts are relatively easy for visitors to remember and report; (2) they strongly affect feelings of solitude, a central experience in a wilderness visit; and (3) they should be directly related to use levels and, thus, managed easily by use limitations.



**TABLE 1**  
Ratings of four wilderness experiences versus number of groups met or seen: uniform association models.

EXPERIENCE	ODDS RATIO	L <sup>2</sup>	DF <sup>1</sup>	p
Feeling of solitude.	.6254	3.044	5	.693
Feeling of freedom	.7559	11.182	8	.192
Feeling that no one had been there before	.8205	8.503	5	.131
Feeling of unspoiled wilderness	.8292	10.540	8	.229

<sup>1</sup>Degrees of freedom vary because some categories were collapsed to accommodate situations of sparse data.



5. A required sample size was estimated to permit estimates of population statistics of  $\pm 3\%$  at 95% confidence. The sample size was determined as follows. First, from visitation records, we predicted that 1,000 permits would be issued during the sampling period. Second, we assumed that 50% of the permits would turn out to be no-shows. This assumption maximized the sample size that would be required to estimate statistics at the desired confidence level for each population (visitors and no-shows). Based on the prediction and the assumed no-show rate, the required sample size was calculated using the following formulae from Cochran (1963):

First Approximation:

$$n_o = t^2 pq / d^2$$

Second Approximation:

$$n = n_o / (1 + (n_o - 1) / N)$$

Where:

$n_o$  = the first approximation of the sample size (assuming an infinite population universe);

$t$  = the  $t$  statistic, 1.96 at 95% confidence;

$p$  = the probability of the characteristic being measured occurring (assumed to be 0.5 to maximize the estimate of the sample size);

$q$  = the probability of the characteristic not occurring (also 0.5);

$d$  = the desired confidence interval (chosen to be plus or minus 3% for this study);

$N$  = the estimated size of the visitor (or no-show) population (500 permit holders);

and

$n$  = the required sample size.

Applying the formulae:

$$n_o = (1.96)^2 (0.5)(0.5) / (0.03)^2 = 1067$$

$$n = 1067 / (1 + (1067 - 1) / 500) = 341$$

Thus, the total sample size required for visitors and no-shows =  $2 \times n = 682$ . After assuming an 80% response rate, we estimated that a total sample of 852 permit holders would be required. Budget constraints, however, limited our questionnaire mailings to 800. Nevertheless, our achieved sample size of 665 respondents was reasonable in light of an estimated 13.5% no-show rate. At this rate, a sample size of 600 permit holders would have been considered adequate for our desired confidence level.

6. Calculation of the weights was based on a formula provided in Frankel (1983). Our weighting procedure gives each respondent equal probability of responding to the survey according to the formula:  $P_s = w_i \times P_{ai} \times P_{ri}$ , where  $P_s$  = the probability of being a respondent in the survey;  $w_i$  = the weighting factor for month  $i$ ;  $P_{ai}$  = the probability of being sampled during month  $i$ ; and  $P_{ri}$  = the probability of responding during month  $i$ .  $P_s$  was set at .56, which was the overall probability that a permit holder responded to our survey ( $P_s = 665/1178$ ; see table 2).
7. Forty-eight mailings were made during the sampling period.
8. The feces response was used as a screen because of its obvious repulsiveness.

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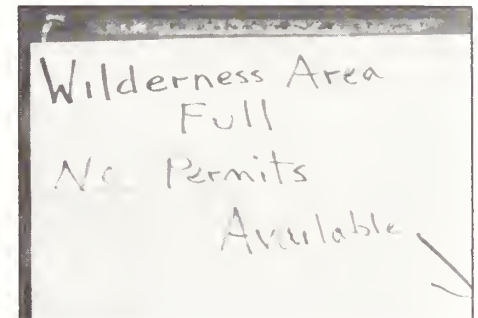
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<sup>1</sup>Degrees of freedom vary because some categories were collapsed to accommodate situations of sparse data.

Note that we define social contacts as contacts with groups, not contacts with individuals. Although associations were found between ratings of wilderness experiences at ACW and numbers of people met or seen, they could not be summarized as simply as the models based on group contacts. Consequently, we concluded that contact with groups is a better predictor of social impact than contact with individuals.<sup>4</sup> In this chapter, then, we focus solely on groups as the social contact measure, a significant choice since the current use limit regulates total numbers of people. We discuss the managerial implications of our decision in the conclusion of this chapter.

## RELATIONSHIP BETWEEN USE LEVELS AND SOCIAL CONTACTS

For a use limit to be a viable management tool, social contacts must be related to use levels. Assuming that social contacts have a negative impact on wilderness recreation experiences,<sup>5</sup> increasing use levels encourage the social interactions that cause social impacts (figure 1). By placing a cap on use levels, managers should be able to limit social interactions and thus limit impacts. If use levels and contacts are unrelated, imposition of a limit accomplishes little more than unduly regimenting visitor behavior. At ACW, use levels and social contacts were strongly related. Numbers of encounters with other groups (as reported by visitors in question 28 of the mail questionnaire [see appendix 1]) were compared with actual use levels (from BLM, Safford District records) using a

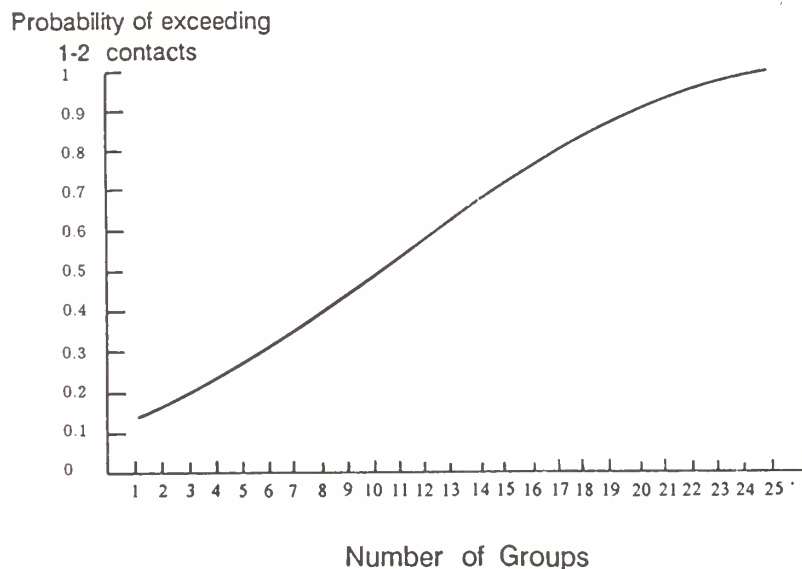
logistic regression model. The model showed that as the number of groups increased in ACW, social contacts also increased (figure 2).<sup>6</sup> For example, when five groups are visiting ACW, the probability that a visitor will encounter three or more groups during a one-day visit is about 27%. If 10 groups are in the wilderness area, the probability climbs to 45%.



**FIGURE 1**  
Use limits influence numbers of social contacts which, in turn, affect recreational experiences.

## FIGURE 2

Probabilities of Exceeding  
1-2 Social Contacts During a One Day Visit  
Groups met/seen v. Numbers of Actual Groups



**CONTACT PREFERENCE STANDARDS** According to our research at ACW then, social contacts influence attainment of some recreation experiences and use levels determine the number of social contacts experienced by visitors. A key variable remaining in our evaluation of the use limit is the number of social contacts that is acceptable to visitors. This number, termed a contact preference standard (Shelby and Heberlein 1986), forms the basis of a capacity limit. From contact preference standards and based on the relationship between use levels and social contacts, managers can establish a use limit that keeps social contacts within bounds that are acceptable to the visitors. In the vernacular of wilderness management planners, then, contact preference standards represent limits of acceptable change (Stankey et al. 1985).



When determining social contact standards for a wilderness area, researchers must examine (1) whether all visitors desire the same kinds of wilderness experiences and (2) how much they agree on acceptable levels of encounters.<sup>7</sup> If different types of visitors desire different kinds of wilderness experiences and are willing to accept different amounts of social contact, the wilderness manager may have to establish contact standards for each type of visitor or manage for a "criterion" group of visitors. To examine the different tastes and preferences of Aravaipa's visitors, we first categorized the respondent population according to 13 demographic and other variables. Number of lifetime visits, gender, education, age, residence (urban to rural), income, season of visit, number of people in party, number of children in party, group type (family, friends, etc.), and membership in conservation or other organizations were used to categorize the respondents. "Consumer profiles" were also developed with cluster analysis (see appendix 3).

Next, we cross-tabulated these variables against scores on five wilderness value scales (table 2) which had been constructed to rate respondents according to the kinds of recreation experiences they desired. So that the analyses could be conducted in crosstables, the wilderness value scores were divided into quintiles. Twelve of the 13 variables had some degree of association with scores on at least one of the wilderness scales (table 3). Six variables (consumer profile, experience, gender, education, age, and group size) were associated with scores on three or more of the scales. Based on this analysis, we concluded that the subpopulations disagree about the types of experiences to be provided at ACW (experiences desired and membership in social groups were not independent in all circumstances).

We then compared the 13 subpopulation variables against social contact preferences. We also attempted to predict social contact preferences with wilderness value scores. In both cases, medium-sized (4-6 people) groups were used as the basis of social contact preferences. We used medium-sized groups as the criterion for two reasons. First, 81.9% of all contacts reported by our respondents were with groups consisting of six or less people. This corresponds rather well with 89.7% of respondents reporting that they travelled with groups of seven people or less. Accordingly, medium-sized groups cover most of the actual contact situations visitors will have in ACW. Second, using medium-sized groups to set social contact standards provided a reasonably rigorous test of the capacity limit at ACW. Our chosen criterion arrived at a lower capacity

**TABLE 2**  
**Description and ranges of scores for wilderness value scales.<sup>1</sup>**

SCALE	VARIABLE	FACTOR SCORES RANGE
<b>CONVENIENCE:</b> the degree to which a respondent desires improvements that simplify or reduce the difficulty of a wilderness trip. High scores on this scale indicate that the respondent desires more convenience.	Interpretive signs	.47-3.96
	Maintained trails	X=2.304
<b>SELF-RELIANCE:</b> the degree to which a respondent desires to accomplish his or her visit without the aid of other people. High scores on this scale indicate that the respondent is <u>less</u> self reliant.	Being on your own	-.42-3.09
	Being near others who can help	X=1.101
	Knowing that rangers are on patrol	
	No one else at all in ACW	
<b>NATURISM:</b> the degree to which a respondent desires to experience wilderness on its own terms. High scores on this scale indicate that the respondent desires more naturalistic environs.	Light from other visitors' campfires	
	Swimming in the nude	-.50-3.35
	Seeing a flood in ACW	X=1.739
<b>SOLITUDE:</b> the degree to which a respondent desires a solitude experience. A high score on this scale indicates that the respondent desires more solitude.	Hiking alone	
	Hiking alone	.91-3.86
	Being alone	X=2.518
<b>PRISTINE:</b> the degree to which a respondent desires the wilderness surroundings not to show evidence of humans.	Being on your own	
	Knowing that rangers are on patrol	.97-5.42
	Hiking alone	X=2.757
	No one else at all in ACW	
	Smoke from campfires in ACW	
	Charred logs and ash from campfires	
	Light from other visitors' campfires	

<sup>1</sup> See appendix 2 for factor loadings and t values.



**TABLE 3**  
**Wilderness scale scores in quintiles versus demographic and other variables:**  
**Independence models. x = independence hypothesis fails at  $p < 0.05$ .**

VARIABLE	SOLITUDE	SELF-RELIANCE	CONVENIENCE	NATURISM	PRISTINE
Cluster membership	x	x	x	x	
Lifetime visits <sup>1</sup>	x	x	x		
Gender	x	x	x		
Education <sup>2</sup>	x	x	x	x	
Age <sup>3</sup>	x	x	x	x	
Residence <sup>4</sup>					
Income <sup>5</sup>	x				
Season of visits					
Group size <sup>6</sup>	x	x	x		
Children in party <sup>7</sup>	x				
Group type <sup>8</sup>	x	x			
Membership in conservation group <sup>9</sup>	x				
Membership in activity group <sup>10</sup>	x				

<sup>1</sup>Coded as 1=never visited, 2=1 time, 3=> 1 time

<sup>2</sup>Coded as 1=some college or less, 2=college graduate, 3=graduate degree

<sup>3</sup>Coded as 1=under 35 years, 2=35-44 years, 3=over 44 years

<sup>4</sup>Coded as 1=large metropolitan area, 2=metropolitan area, 3=semi-urban to rural area

<sup>5</sup>Coded as 1=under \$25,000, 2=\$25,000 to \$49,999, 3=\$50,000 or more

<sup>6</sup>Coded as 1=1-2 people, 2=> 2 people

<sup>7</sup>Coded as 1=no children in party, 2=children in party

<sup>8</sup>Coded as 1=family, 2=friends and acquaintances, 3=alone, 4=organized group

<sup>9</sup>Coded as 1=member of conservation oriented group, 2=not a member

<sup>10</sup>Coded as 1=member of activity oriented group (e.g., a hunting or fishing club), 2=not a member

than would have been developed from a small group criterion and a higher capacity than would have been derived from a large group criterion.

Only educational attainment and solitude scores on the wilderness value scales were associated with social contact preferences (for medium-sized groups). We found a negative relationship between solitude scores and social contact preferences: the higher the need for solitude (as indicated by a higher score on the solitude scale), the lesser the acceptance of social contacts.<sup>8</sup> The association between education and social contact preferences was more complicated. Less acceptance of social contact was associated with people holding undergraduate degrees than those with graduate degrees or no college degrees.<sup>9</sup>

Because solitude needs and educational attainment were associated with preferences for social contact, standards must be specified for each level of these respondent subpopulations. To develop standards, we used a simple, but conservative rule of thumb: a contact preference standard is the frequency of contact that is acceptable to at least 50% of the members in each category of a visitor subpopulation. The standards for each quintile of the solitude scores and each level of educational attainment are presented in table 4. A remarkable degree of accord characterizes these standards. For each level of both subpopulations, more than 90% of the respondents agreed on a standard, which, in

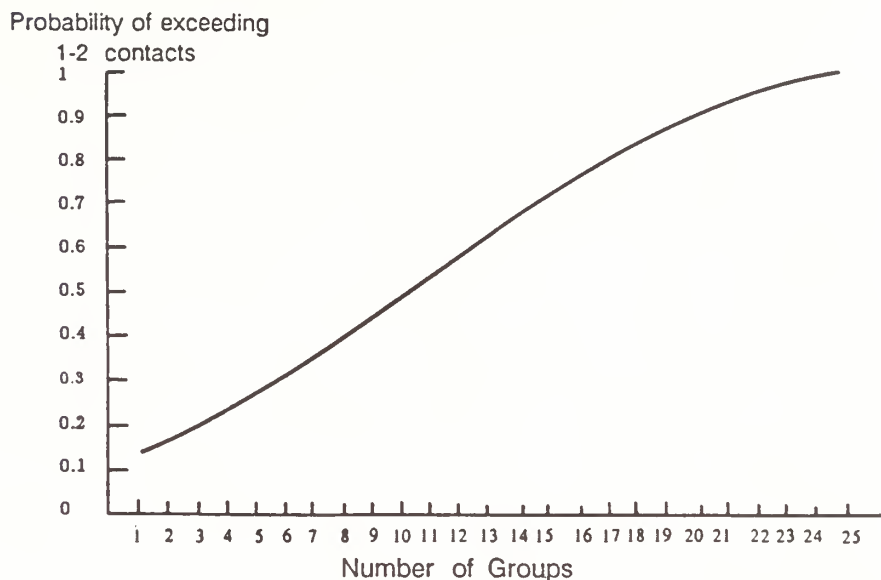
all cases, was 1-2 contacts for a one-day trip. Because the standard was the same for all of the respondent categories, then, only one contact preference standard is required for Aravaipa Canyon.

To evaluate the use limit at ACW, we examined how different levels of use would change the probability that the contact standard would be exceeded (figure 3). The graph that was derived is nearly identical to figure 2. The only difference is that, instead of showing the probability that a visitor would encounter three or more visitors during a visit, it shows the probability that a standard of one to two contacts would be exceeded. If approximately 11 groups are present in ACW, a visitor has even odds (1:1) or a 50% probability of meeting or seeing more groups than the standard. Assuming an average group size of five people, this figure more or less represents the current limit of 50. But, setting the limit at 11 means that management is comfortable with the idea that when 11 groups are visiting ACW, 50% of the visitors will meet or see enough groups to exceed the contact standard. If management thinks that this probability is too high, then a lower limit must be established. For example, to reduce the probability of exceeding the standard to 25%, a limit of about five groups would be required. Conversely, if management is willing to accept a 75% probability of the standard being exceeded, the limit could be raised to approximately 19 groups.

Therefore, *establishing a capacity limit is a judgmental process*, a process that must be rooted in management objectives (Wagar 1964; Held, Brickler, and Wilcox 1969; Lime and Stankey 1971; Lime 1976; Becker, Jubenville, and Burnett 1984; Burch 1984; Graefe, Vaske, and Kuss 1984; Stankey and McCool 1984; Shelby and Heberlein 1986). All scientific research can do is "[describe] the social...consequences of alternative use levels, thus providing an opportunity for managers to judge whether these consequences are consistent with area management objectives" (Stankey 1979:51). Management must decide which probability of exceeding the contact standard is appropriate given the objectives for Aravaipa Canyon Wilderness.

**FIGURE 3**

Probabilities of Exceeding  
Social Contact Standard of 1-2 Contacts  
Groups met/seen v. Numbers of Actual Groups



**TABLE 4**

Social contact preference standards for each  
quintile of the solitude scale and each level of  
education attainment. (N=665)

SOLITUDE QUINTILE <sup>2</sup>	STANDARD <sup>1</sup>	% AGREEMENT
I	1-2	97.1%
II	1-2	96.0
III	1-2	95.2
IV	1-2	94.3
V	1-2	87.4
Education		
Some college or less	1-2	95.5
College graduate to some graduate school	1-2	93.4
Graduate degree	1-2	94.9

<sup>1</sup> Number of encounters a respondent would accept with a medium-sized group during a one-day stay.

<sup>2</sup> See appendix 2 for a description of how the solitude scale was developed.

## CONCLUSIONS

This chapter has traced our reasoning in evaluating the use limit at Aravaipa Canyon Wilderness. We offer the following conclusions:

1. Our results indicate that the current policy of limiting total visitation in ACW may be addressing the wrong issue. Numbers of groups appear to have a more consistent and pronounced influence on visitor's recreational experiences. Consequently, we recommend that the BLM adopt a policy of *group management* rather than management of total visitation. The practical implication of this recommendation is that the BLM would begin restricting the number of permits for entering ACW rather than the number of people.
2. Based on a criterion group size of four to six people, the social contact standard for Aravaipa Canyon is 2 contacts for a one day visit. (As noted previously, this standard only refers to the canyon corridor. See chapter 5 for a description of the corridor.)
3. If ACW were operating at a capacity limit of 11 groups, visitors would have an even chance of meeting or seeing more than two groups during a one day visit (thus exceeding the contact standard).
4. If other limits were implemented, the probability of exceeding the contact standard would change correspondingly. For example, if a limit of less than 11 groups were implemented, the probability of exceeding the standard would be less than 50%, and vice versa (see figure 3).

Obviously, to simplify our evaluation, many important variables (e.g. size and type of groups to be encountered, location of contacts, etc.) were not considered. They are, however, considered in later chapters. Our intention in writing this chapter was to provide a basis for further discussions regarding the use limit. In the Research Summary (pages 13-21), we synthesize these results with the results of the following three chapters and present final recommendations regarding the use limit.

## ENDNOTES

1. Technically, because the use limit only applies to the main canyon and the side canyons, more than 50 people can visit the entire wilderness area.
2. Consistent with the scope of our research, ecological consequences of the use limit are not considered in this chapter.
3. Questions 25, 27, and 28 were analyzed for this section (see appendix 1).
4. This result makes sense because small recreational groups tend, more or less, to be cohesive social units (Heywood 1974). And, because of "in-group/out-group" mentalities, each group might tend to view other groups as discrete social units. Thus, the parts of the group encountered (individual people) would be less impacting than the whole.
5. This assumption is only true for certain types of wilderness recreation experiences.
6. The logistic regression equation is

$$\ln(F_{21}/F_{31}) = 1.50 - .17\text{GROUPS} + \text{STAY}$$

where  $\ln(F_{21}/F_{31})$  = the odds of encountering 1-2 rather than 3 groups; GROUPS = the total number of groups visiting ACW; and STAY = .37 for a one-day trip and -.37 for a two or

more day trip ( $L^2=54.7$ ,  $df=54$ ,  $p=.45$ , all parameters significant [ $p<.006$ ]). Addition of the independent variables GROUPS and STAY achieved a significant improvement in fit over a model with no independent variables (change in  $L^2=105.9$ ;  $df=4$ ;  $p<.001$ ).

7. These two statements relate to two of three requirements for calculating social carrying capacities proposed by Shelby and Heberlein (1986:22): (1) "to establish social capacity there must be agreement among relevant groups about the type of recreation experience to be provided" and (2) "to establish capacity there must be agreement among relevant groups about appropriate levels of social impact".
8. This relationship was modelled with logistic regression. Addition of one independent variable, solitude score, achieved a significant improvement in fit over a model with no independent variables (change in  $L^2=61.9$ ;  $df=2$ ;  $p<.001$ ). For the contrast between zero contacts and three or more contacts (see question six in the mail questionnaire [appendix 1]), the equation was

$$\ln(F_1/F_2)=-3.66+.82 \cdot \text{SOL},$$

where  $\ln(F_1/F_2)$ =the log odds of preferring zero contacts rather than 1-2 contacts with a medium-sized group and SOL=the solitude score (see appendix 2). For the contrast between 1-2 contacts and 3 or more contacts ( $\ln[F_2/F_3]$ ), the formula was

$$\ln(F_2/F_3)=-.085+.41 \cdot \text{SOL}.$$

$$*p<.001$$

9. The pattern of association between education and social contact preferences was described with a row-effects log-linear model ( $L^2=1.286$ ,  $d.f.=2$ ,  $p=.526$ ). (See Clogg and Shockey 1988 for a description of a row-effects model.) The row-associated odds ratio for college graduates vs. respondents with graduate degrees was 1.57; for some college vs. college graduate, .65; and some college v. graduate degrees, .55.





## 4. SOCIAL SETTING

Because wilderness areas are relatively devoid of people, social interactions are unique and memorable. They stand out in one's mind as rare and interesting events that color the entire recreation experience. Consequently, the social setting of a wilderness area is an important management concern.

As described in chapter one, by the term "social setting" we include all social interactions people can have during a visit to ACW: greeting other hikers on a trail; sharing information; observing people as they engage in recreational activities; hearing voices of nearby campers; and so on. Not included in our definition are many indirect ways of feeling the presence of others, such as finding litter, rock fire rings, or damaged vegetation.

In this chapter, we examine how respondents felt about and were affected by social interactions. Before addressing these issues, though, we first describe the population that visited (or at least planned to visit) Aravaipa Canyon Wilderness during our study period. This description sets the stage for further analyses and discussions. After describing the population and reporting on their social preferences, we conclude the chapter by highlighting those attributes of the social setting that can be influenced by management.

### DESCRIPTION OF THE RESPONDENT POPULATION

**AGE, GENDER AND RACE** A breakdown of ages by categories is provided in table 1. The mean age of the respondent population was approximately 39 years (95% c.i.=  $\pm .88$  years); the youngest respondent was 17 years old, the oldest 94 years. In comparison to the general Arizona population and a sample of Arizona wilderness users (table 2), people 30 to 49 years old were overrepresented in the respondent population. Compared to wilderness areas throughout the United States, the middle age categories were also overrepresented. The distribution of ages in table 1 was similar to only one of 28 wilderness areas tabulated by Roggenbuck and Lucas (1987:219). Most other areas have much greater numbers of visitors under age 30 than does ACW.

Because our sample only included permit holders, and children are not likely to obtain permits, our sampling scheme systematically excluded children. Consequently, comparisons to the Roggenbuck and Lucas (1987) results may not be entirely valid. If all visitors had been included in the sampling frame, our results would probably include more children and, therefore, the <30 years bracket would be larger. In fact, by comparing question 53 to question 52 (see appendix 1), we computed that approximately 13% of the entire visitor population were children. Thus, the dominance of middle aged respondents may not be as extreme as it appears from responses to the age item.

About 2/3 (65%) of the respondent population were male and 1/3 were female (table 2).<sup>1</sup> Males were overrepresented in comparison to the Arizona census and wilderness user populations (table 2). But, our sample included more females than nearly all of the wilderness areas summarized by Roggenbuck and Lucas (1987). Only one of those areas had a lower male:female ratio than ACW. Many wildernesses had considerably higher percentages of males.

The respondent population was also predominantly white (97%); hispanics made up 1.4% of the sample; other races constituted less than 2%. ACW's racial mix is typical of wilderness. Ninety percent of the sample of Arizona wilderness users were white (Pearson et al. 1983). Non-whites are less likely to participate in primitive forms of natural resource recreation than whites. Cultural

**TABLE 1**  
Age of respondents  
by category. (N=659)

AGE CATEGORY	PERCENTAGE OF POPULATION
17 to 20 years	0.5
21 to 24 years	4.2
25 to 34 years	34.8
35 to 44 years	34.9
45 to 54 years	14.8
55 to 64 years	6.7
65 to 74 years	3.6
75 years and older	0.4

**TABLE 2**  
**Demographic characteristics (%)**  
**of the respondent population (N=665)**  
**compared to Arizona residents in 1980 (U.S.**  
**Bureau of the Census 1983) and wilderness**  
**users in 1982 (Pearson et al. 1983)**

DEMOGRAPHIC VARIABLE	ACW	ARIZONA CENSUS	ARIZONA WILDERNESS USERS
<b>INCOME</b>			
<\$ 9,999	6.1	56.8	14.9
\$10,000-\$24,999	24.3	3.7	37.4
\$25,000-\$49,999	43.5	8.0	36.8
>\$50,000	26.1	1.6	10.8
<b>AGE</b>			
<30	16.6	51.3	17.4
30-39	43.9	13.7	22.6
40-49	20.4	9.6	16.9
≥ 50	19.1	25.4	42.3
<b>EDUCATION</b>			
≤ 12 YEARS	5.3	63.1	27.9
13-15 YEARS	25.4	21.4	
16 YEARS	22.1	8.2	44.0
>16 YEARS	47.5	7.3	28.1
<b>GENDER</b>			
MALE	65.4 <sup>1</sup>	49.1	56.9
FEMALE	32.6	50.9	43.1

<sup>1</sup> Totals for the ACW gender category do not sum to 100% because some respondents (usually husband and wife) completed the questionnaire jointly.

**TABLE 3**  
**Occupations of respondents (N=653)**

OCCUPATION <sup>1</sup>	% OF SAMPLE
Professional, technical and kindred workers	54.4
Owners, self-employed people, managers and administrators, except farm	11.8
Sales workers	3.9
Clerical and kindred workers	4.6
Craftsmen and kindred workers	3.1
Operatives, except transport	1.1
Laborers, except farm	2.6
Farmers and farm managers	0.2
Farm laborers and farm foremen	0.1
Service workers, except private household	2.9
Private household workers	0.0
Homemaker	2.4
Retired	5.2
Student	6.2
Unemployed	0.4
Other	1.1

<sup>1</sup> Based on the occupational classification system of the U.S. Bureau of the Census as presented in Miller (1983).

differences between white and non-white ethnic groups as well as socioeconomic barriers to participation may explain this phenomenon (Meeker 1975; Washburne 1978; Washburne and Wall 1980; Searle and Jackson 1985).

**INCOME, EDUCATION, OCCUPATION AND RESIDENCE** The respondent population earned higher incomes and was more educated than either the Arizona census or wilderness user populations (table 2). Whereas only 1.6% and 10.8% of the census and user populations, respectively, earned over \$50,000 per year, 26.1% of the ACW population did so.<sup>2</sup> Forty-eight percent of the respondents had pursued at least some graduate studies, contrasted to 7.3% of Arizona residents and 28.1% of Arizona wilderness users. Similar comparisons extend to the wilderness areas reviewed by Roggenbuck and Lucas (1987). Of note is the low percentage of students included in our sample (6.2%). All but one of 20 wilderness areas tabulated by Roggenbuck and Lucas (1987) had a higher percentage of students. Many had percentages exceeding 30% (Roggenbuck and Lucas 1987).

Correlatively with the educational attainment of ACW's visitors, the population also tended to be employed as professionals and managers (54.5% and 11.8%, respectively) (table 3) and reside in large metropolitan areas (74% of the sample reported that they live in areas of 150,000 population or more).

These figures compare to 24.7% of Arizona residents employed in professional and managerial fields and 50.7% living in areas with populations greater than 100,000 people (U.S. Bureau of the Census 1983). The dominance of urban over rural visitors was similar to the Roggenbuck and Lucas (1987) results. Predictably, the west entrance of the wilderness area, which is considerably closer to Phoenix and Tucson than the east entrance, attracted more urban visitors (table 4). See tables 3 and 4 for a detailed breakdown of occupational and residential categories.

**MEMBERSHIPS** Compared to Arizona residents (Pearson et al. 1983), respondents to the survey were much more likely to belong to natural resource and wildlife conservation groups or hiking clubs (table 5). Few of the respondents claimed memberships in either off-road vehicle or hunting and fishing clubs. From this information we can infer that many visitors to ACW are environmentally oriented, favoring biocentric (biologically oriented), rather than anthropocentric (man centered), management emphasis.

**BACKCOUNTRY EXPERIENCE** Backcountry experience, analytically, was approached from four directions: number of visits to ACW during the previous 12 months; visits to ACW during the previous 36 months; lifetime visits to ACW; and annual visits to Arizona wilderness areas. In table 6 we summarize visits

to ACW for visitors and no-shows (no-shows are respondents who obtained a permit but did not visit ACW). For both populations, nearly one-half of the respondents had never visited ACW before (table 6). This figure is higher than for the wilderness areas summarized by Roggenbuck and Lucas (1987). For most of these areas, 30 to 40 percent of the visitors were first time users.

No-shows were more likely to have visited at least once during the 12 previous months.<sup>3</sup> Visitors tallied more lifetime visits than no-shows, though: mean for visitors=2.86 visits and mean for no-shows=1.39 visits ( $t=3.11$ ,  $d.f.=281.6$ ,  $p=.002$ ). Therefore, people who visit ACW less in their lifetime may be less likely to use their permit. We return to this idea in the management chapter (chapter 6).

Aravaipa's visitors can be considered wilderness, or at least wildland, enthusiasts: 33.3% visit wilderness areas 1-2 times per year; 27.4% visit 3-5 times per year; 11.5% visit 6-9 times per year; and 19.5% visit more than 10 times per year. Assuming that most respondents had a reasonable perception of what a wilderness area is<sup>4</sup>, then, about 96% have visited a wilderness or wilderness-like area in the past. This figure is considerably higher than that reported by Roggenbuck and Lucas (1987): they note that between 70 and 90 percent of western wilderness users have made at least one visit to a wilderness or wildland area in their lifetime.

**GROUP TYPE, MODE-OF-TRAVEL, GROUP SIZE, CHILDREN IN PARTY, AND ACTIVITIES** Most groups that visited ACW consisted of family members or friends, hikers, seven or fewer members, and no children (table 7). They enjoyed hiking, relaxing, photography, observing wildlife other than birds, camping, bird-watching, backpacking, swimming, and rock climbing (table 8). A limited number rode horses, hunted, studied the geology, read, swam or sunbathed in the nude, studied insects, engaged in sex, pursued religious experiences, painted or sketched, and gazed at stars.<sup>5</sup>

The group types and group sizes listed in table 7 compare favorably with the information tabulated by Roggenbuck and Lucas (1987): small groups of family members or friends are the primary users of wilderness. The numerical majority of hikers over horseback and packstock users is also typical. ACW is unique, however, in its relative lack of "consumptive" activities: hunting and fishing are important activities in many western wilderness areas (Roggenbuck and Lucas 1987).

#### **LENGTH OF STAY, WEEKDAY V. WEEK-END VISIT, AND SEASON OF VISIT**

Visitors stayed an average of 2.2 days (table 9), which is comparable to the areas summarized by Roggenbuck and Lucas (1987).<sup>6</sup> They tended to visit on weekends, because of work and school schedules, and during the spring, to enjoy the milder weather (table 9). Such visitation patterns are typical of wilderness areas in the U.S.:<sup>7</sup> people schedule outings during free time and during favorable seasons.<sup>8</sup>

**TABLE 4**  
Residence locations of the respondent population (N=658).

LOCATION	WEST ENTRANCE	EAST ENTRANCE	COMBINED
Large metropolitan (≥500,000 people)	66.2%	49.5%	58.7%
Medium metropolitan (150,000-499,999 people)	16.0	14.9	15.2
Small metropolitan (50,000-149,999 people)	5.1	5.8	6.3
Semi-urban (10,000-49,999)	4.3	8.7	6.5
Semi-rural (2,500-9,999)	4.8	9.3	6.5
Rural (<2,500 people)	3.6	11.8	6.8

**TABLE 5**  
Number of respondents belonging  
to one or more of six types of organizations

	APPROXIMATE % OF SAMPLE <sup>1</sup>	ARIZONA POPULATION <sup>2</sup>
Natural Resource Conservation	35	1 %
Wildlife Conservation	25	2
Off-Road Vehicle Club	1	1
Hiking Club	13	2
Fishing or Hunting Club	3	4
Youth Organization	5	-

<sup>1</sup>Based on a sample size of 665.

<sup>2</sup>Pearson et al. (1983).



**TABLE 6**  
Number of visits paid to ACW by visitors and no-shows during the past 12 months, 36 months, and their lifetime.

	PERCENT OF VISITORS IN EACH CATEGORY	
	VISITORS <sup>1</sup>	NO-SHOWS
<b>VISITS DURING PREVIOUS 12 MONTHS<sup>1</sup></b>		
0 times	79.3	69.3
1 time	15.8	24.3
2-5 times	4.8	6.5
6 or more times	0.0	0.0
	N=540	N=78
<b>VISITS DURING PREVIOUS 36 MONTHS</b>		
0 times	59.6	64.1
1 time	18.3	20.8
2-5 times	19.6	12.2
6 or more times	2.5	3.0
	N=518	N=70
<b>VISITS DURING LIFETIME</b>		
0 times	48.4	51.8
1 time	15.8	26.3
2-5 times	23.4	14.4
6 or more times	12.4	7.4
	N=525	N=77

<sup>1</sup>So that the number of visits for visitors and no-shows could be compared, only visits previous to the most recent one were tallied for visitors.

**TABLE 7**  
Type, mode-of-travel, size, and number of children in groups visiting Aravaipa Canyon Wilderness. (N=570)

<b>GROUP TYPE</b>	
Family	37.0% <sup>1</sup>
Friends and acquaintances	52.0
Organized	9.0
Alone	9.0
<b>MODE-OF-TRAVEL</b>	
Hike	93.6
Ride horses	1.4
Ride horses and hike	0.6
Hike and use packstock	4.3
Ride horses and use packstock	0.1
Ride horses, hike and use packstock	0.0
<b>GROUP-SIZE</b>	
1-2	52.0
3-4	24.9
5-7	12.8
8-10	5.7
11 or more	4.7
<b>NUMBER OF CHILDREN</b>	
0	85.1
1-2	10.1
3 or more	4.8

<sup>1</sup>Percentages do not add to 100% because respondents could check more than one category.

**CONSUMER PROFILE AND WILDERNESS ATTITUDES** Cluster analysis was used to group respondents into five profiles. Most of the respondents (76%) fell into one profile (III, table 2, appendix 3). One significant cluster (I) accounted for 11% of the sample. It included a predominance of males and people who visited ACW, on the average, quite a lot more than other visitors. They also tended to be slightly older, lived in more urban environments, had larger group sizes, and travelled with more children than cluster III. Another cluster, II, with 12% of the sample, had members that were less educated, older, from more rural areas, and of lower income than most visitors. Two additional, very small clusters included very large groups (IV) and people with a great deal of experience in ACW (V).

The respondents were also classified according to their wilderness attitudes on five scales: solitude, convenience, self-reliance, naturism, and preferences for a pristine environment. Using confirmatory factor analysis (Jöreskog and Sörbom 1986), we scored respondents according to how much solitude they desired, the degree to which they desired conveniences such as trails and signs, how self-reliant they were, the degree to which they were willing to accept the wilderness environment on its own terms, and their preferences for pristine surroundings.

Because this classification scheme does not offer an objective standard about wilderness values, we do not make any pronouncements about the respondents here, other than saying that the ranges of factor scores indicates that respondents have ranges of tastes on each scale. It did, however, allow us to compare the *relative* strength of respondents' wilderness values in other analyses. Analogously, the consumer profile was developed to determine how uniform the sample was on particular demographic variables and how the groupings that were derived might influence preferences. See appendices two and three for further details on the consumer profile and the wilderness value scales.

## PREFERENCES FOR SOCIAL INTERACTION

**AMOUNT OF SOCIAL CONTACT** Low levels of social contact were preferred by most respondents: in chapter 3 we identified a social contact standard of 1-2 contacts with a medium-sized group during a one-day visit. This low level of social interaction is supported by the respondents' preference for visitation levels in ACW. Sixty-four percent liked the idea of having only one to ten people in the wilderness area during their visit. Furthermore, solitude experiences were desired by a number of respondents: 56% regarded being alone to be at least moderately important; 69% would like to hike alone; and 68% expressed an interest in camping alone.

Although low levels of social interaction were preferred by many respondents, several respondents did not cherish a self-reliant adventure and

drew comfort from the idea that other people were in the wilderness area or even nearby. According to one respondent, "I feel if other people are in the area there is a better chance of finding help in an emergency or accident." Thirty-six percent of the respondents reported that it was not important or only slightly important to be on their own. A similar percentage disliked or were neutral to the idea of having no-one else in the wilderness area. Twenty-seven percent thought it at least moderately important to be near others who could help if they needed it. And, 44% of the sample found it only slightly or not important to be alone.

**GROUP SIZE** In general, the larger the group one was likely to encounter, the less desirable would be the potential meeting in the wilderness. We observed this relationship with regard to campsite privacy and contact preference norms. In three hypothetical situations,<sup>9</sup> as group size increased from small to medium to large, the respondents were much more likely to indicate that they would dislike or strongly dislike having that group camp nearby (table 10). Strong feelings against large groups were registered: 93.5% of the sample would dislike or strongly dislike having a large group camped nearby.

Similarly, contact preference norms varied according to the size of the group likely to be encountered. Lower contact norms were associated with larger group sizes (table 11). As with the campsite scenario, large groups were particularly abhorred: 38% of the respondents to the mail questionnaire would accept no contacts with a large group. Similar results were recorded with picture interviews (table 11 [see chapter 2 for a description of the picture interview method])<sup>10</sup>

**GROUP TYPE** Encounters with hunters, horseback riders, nude sunbathers or nude swimmers, and hikers with pack stock were less acceptable than encounters with individual hikers (male or female), birdwatchers, youth groups, and school classes on field trips (table 12). Of six groups depicted in paired-picture interviews (see chapter 2 for a description of the method), hikers were ranked first followed (in order of decreasing rank) by birdwatchers, nude sunbathers, horseback riders<sup>11</sup>, hikers with pack stock<sup>11</sup>, and hunters (table 13). Hunters were particularly undesirable to the respondents. In their comments, respondents raised concerns about safety, noise, and the desirability of hunting at all in ACW, given its perceived role as a wildlife preserve (many respondents appear not to differentiate ACW from national parks where, generally, hunting is not permitted). Horses and pack stock, which were associated with numerous environmental impacts, also roused the ire of the respondents. Interestingly, though, in the picture interviews, the respondents showed a willingness to accept more contacts with hikers leading packstock than with horseback riders (table 12). Possibly, the respondents identified with the hikers in the picture. In paired comparisons, however, horseback riders and pack stock users were ranked identically.

## INFLUENCE OF DEMOGRAPHIC AND PERSONAL CHARACTERISTICS ON PREFERENCES FOR SOCIAL INTERACTION

In this section we address three groups for which respondents tended to have negative opinions: large groups, horseback riders, and nude sunbathers. We are not addressing two notable exceptions: (1) hunters and (2) hikers with packstock. Hunters, indeed, garnered a good share of animosity, but the respondents were nearly unanimous in their dislike of this user group. Little purpose is served by examining differences in attitudes toward an almost wholly disfavored entity. Attitudes toward hikers with pack stock are not investigated further because many respondents expressed confusion over the term "pack stock". Because their (and unidentifiable numbers of others') responses cannot be considered reliable, further analysis of the question is pointless.

**TABLE 8**  
Activities pursued by visitors to ACW (in order of decreasing frequency).

Hiking	87.4% <sup>1</sup>
Relaxing	82.6
Photography	65.0
Observing wildlife other than birds	63.2
Camping	57.9
Birdwatching	55.5
Backpacking	53.5
Swimming	42.0
Rock climbing	26.5
Horseback riding	2.1
Hunting	1.0
Other	14.6

<sup>1</sup>Percentages do not total to 100% because respondents could check as many categories as preferred.



Encounters with small groups were preferred over encounters with large groups.



**TABLE 9**  
Length of stay, weekday of visit,  
and season of visit.

**LENGTH OF STAY**

One day	35.0%
Two days	24.2
Three days	35.5
Four or more days	5.3

N=417

**WEEK DAY - BEGINNING OF TRIP**

Monday	14.8
Tuesday	10.2
Wednesday	9.8
Thursday	9.7
Friday	20.6
Saturday	23.8
Sunday	11.0

N=491

**SEASON OF VISIT<sup>1</sup>**

Spring	43.8
Summer	18.6
Fall	23.4
Winter	14.2

N=665

<sup>1</sup>Season of visit was based on permit requests. Consequently, no-shows are included in these figures. Also, the seasons were roughly approximated as follows: Spring = March, April, and May; Summer = June, July, and August; Fall = September, October, and November; and Winter = December, January, and February.

Attitudes toward horseback riders nearly evenly split the sample. About 50% would accept no contacts with equestrians, another 50% would accept one or more contacts. We investigated whether gender, membership in conservation groups, and group affiliation had an effect on one's choice of zero or one or more contacts. Of these three, only membership in a conservation group had a significant influence on the choice (respondents who did not belong to a conservation group tended to accept more contacts with horseback riders than those who did belong).<sup>12</sup>

Encounters with large groups were more acceptable to groups with children than groups without children and less acceptable to non-whites than whites. Group size did not affect preferences for encountering large or small groups. The size of the group with whom one travelled had little influence on his or her preferences for the size of groups he or she was likely to encounter.<sup>13</sup>

Preferences for contacts with nudists were influenced by gender, age, whether children were with the party, and whether the party was a family. A male respondent under 37 years old who travelled with no children in a non-family group, for example, had .60 odds of preferring zero contacts with nudists to 1-2 contacts (.60 in odds converts to a 38% probability). A female in the same situation had .82 odds, meaning that she was 37% more likely to prefer zero contacts with a nudist than a male. If she were over 36 years old and travelling with at least one child in a family group, her odds more than doubled to 2.09. In sum, age, gender, travelling with children, and visiting with a family group influenced attitudes toward nudists.<sup>14</sup>

## INFLUENCE OF SOCIAL INTERACTION ON RECREATIONAL EXPERIENCES

**FREQUENCY OF CONTACT** In chapter 3 we noted that respondents' ratings of eight kinds of recreational experiences were associated, to a greater or lesser extent, with reported encounters with people and groups. We concluded that contacts with groups consistently were more influential than total encounters with people. Predictably, feelings of solitude were most affected by social contacts (see table 1, chapter 3).

**GROUP SIZE** Using bivariate independence models, we tested whether ratings of eight kinds of wilderness experiences (feelings of solitude, freedom, discovery, untamed wilderness, security, danger, and the feeling that no-one had been [in ACW] before) might have been influenced by the size of the largest group encountered by the respondent during his or her visit. For two of the experience types--feelings of solitude and untamed wilderness--associations existed.<sup>15</sup> In both cases, positive associations were noted when group sizes exceeded nine (i.e. if a visitor encountered a group of ten or more people, they were *more* likely to report higher feelings of solitude or untamed wilderness than otherwise).

**TABLE 10**  
Preferences for size of group  
camping nearby.

	SMALL GROUP	MEDIUM SIZED GROUP	LARGE GROUP
STRONGLY DISLIKE	11.4%	33.0%	73.8%
DISLIKE	29.2	43.2	19.7
NEUTRAL	47.4	18.9	5.3
LIKE	9.8	4.9	0.9
STRONGLY LIKE	2.2	0.0	0.3
	N=622	N=660	N=659

By controlling for the number of contacts with other groups, however, the solitude/group size

association was demonstrated to be spurious.<sup>16</sup> Because use is limited, with large group sizes, visitation in ACW becomes concentrated in a small number of groups. As a result, the potential for social interaction decreases and the opportunity for experiencing solitude increases. This finding confirms numbers of social contacts as a primary influence on feelings of solitude.

For the unspoiled wilderness/group size comparison, including the contacts-experience link did not nullify the association.<sup>17</sup> Both variables appear to influence attainment of the feeling of unspoiled wilderness (encounters with large groups lead to high ratings; encounters with numerous groups lead to low ratings). Again, with larger group sizes, visitors only encounter one or a few other groups rather than a number of groups dispersed throughout the wilderness. Finding recreational use concentrated in one or two spots may lead visitors to believe that most of the wilderness area is relatively unspoiled.

**TABLE 11**  
Acceptable numbers of contacts  
with different sized groups for a one day visit:  
results of questionnaire survey and (picture interviews).

ACCEPTABLE NUMBER OF CONTACTS	SMALL GROUP (1-3 PEOPLE) %	MEDIUM SIZED GROUP (4-6 PEOPLE) %	LARGE GROUP (7 + PEOPLE) %
0 times	1.2 (1.1)	5.7 (16.1)	37.5 (67.4)
1-2 times	36.7 (46.8)	67.0 (60.2)	57.7 (23.2)
3-5 times	49.7 (34.0)	23.3 (17.2)	3.3 (7.4)
6-10 times	10.1 (11.7)	3.1 (5.4)	0.7 (2.1)
10+ times	2.3 (6.4)	0.9 (1.1)	0.8 (0.0)
	N=662 (95)	N=660 (95)	N=660 (95)

**TABLE 12**  
Acceptable frequencies of contact  
with different types of groups for a one day visit:  
mail questionnaires and (picture interviews).

GROUP TYPE	0 TIMES	1-2 TIMES	3-5 TIMES	6-10 TIMES	10+ TIMES
Hunters	88.2% (91.6)	9.3% (4.2)	1.5% (3.2)	0.8% (1.1)	0.3% (0.0)
Horseback riders	47.8 (43.2)	45.1 (45.3)	5.6 (9.5)	0.7 (0.0)	0.8 (2.1)
Youth group	13.9 (16.8)	69.6 (55.8)	12.2 (17.9)	2.8 (4.2)	1.6 (5.3)
Nude sunbathers/swimmers <sup>4</sup>	33.3 (55.8)	44.1 (29.5)	14.1 (10.5)	2.6 (3.2)	6.0 (1.1)
Birdwatchers <sup>1</sup>	- (1.1)	- (50.0)	- (34.0)	- (9.6)	- (5.3)
Lone male hiker <sup>1</sup>	- (7.4)	- (35.8)	- (30.5)	- (14.7)	- (11.6)
Lone female hiker <sup>1</sup>	- (4.2)	- (29.5)	- (41.1)	- (12.6)	- (12.6)
Hikers with packstock <sup>2,4</sup>	46.0 (28.0)	41.1 (62.4)	9.9 (8.6)	1.9 (0.0)	1.1 (1.1)
School class on a field trip <sup>3</sup>	20.0 -	65.6 -	11.1 -	1.7 -	1.7 -

<sup>1</sup> Not included in the mail questionnaire.

<sup>2</sup> Mail questionnaire results may not be reliable since many respondents noted that they did not understand what "packstock" meant.

<sup>3</sup> Not included in the picture interviews.

<sup>4</sup> Mail questionnaire and picture interview distributions were significantly different at  $p < 0.05$ .



**GROUP TYPE** Encounters with two different types of groups--hunters, and horseback riders--failed to influence the recreational experiences of visitors. We tested the hypothesis that feelings of danger reported by respondents would be related to whether they had seen more hunters than they

prefer. The hypothesis was based on the comments of numerous visitors that firearms are dangerous in ACW. But, a loglinear independence model fit the data rather well, indicating no association between the two variables ( $L^2=.04108$ ,  $df=1$ ,  $p=.839$ ,  $N=440$ ). Encounters with hunters, then, did not influence feelings of danger. We also examined whether encounters with horseback riders influenced visitors' feelings of unspoiled wilderness. Again, no association was found ( $L^2=.07218$ ,  $df=1$ ,  $p=.789$ ,  $N=448$ ).<sup>18</sup>

These results, which tend to contradict earlier findings about negative attitudes toward hunters and horseback riders, indicate that encounters with these two types of users were not particularly distressing. Possibly, the reality of meeting disliked groups was less significant than the hypothetical situations posed in question 6 of the mail questionnaire and in the picture interviews (see appendix 1). Nevertheless, few respondents actually encountered hunters or horseback riders. Furthermore, the influence of encounters with these groups was measured on only two types of experience dimensions. Accordingly, the results cannot be regarded as conclusive.

Relationships between recreational experiences and encounters with nude sunbathers and hikers with pack stock were not investigated. Few respondents reported that they had more encounters with these types of groups than they prefer.<sup>19</sup> Consequently, insufficient cases were available for statistical analysis.

Encounters with rangers influenced feelings of safety and danger. Visitors who encountered fewer rangers than they preferred had lower feelings of safety and higher feelings of danger than visitors who encountered as many rangers as they prefer. See chapter 6 for a more complete discussion of this result.

**BEHAVIOR** In questions 48 and 49 (see appendix 1), we asked visitors to report on social encounters that they enjoyed or disliked. Fifty-nine percent of the visitors reported enjoyable encounters; 26% reported encounters that they disliked.

Quiet and courteous behavior was cited by many visitors as contributing to enjoyable encounters. Although conversation was not always important in such interactions, friendly gestures were. "Most people at ACW are there to enjoy themselves and the social contact amongst us is minimal so as to enhance our pleasure," commented one visitor. "It is understood by most backpackers that a simple greeting and a smile is all that is necessary to make the encounter pleasurable and acceptable."

Sharing information, experiences, and resources also contributed to pleasing interactions. Numerous visitors recalled helping other visitors discover their location in ACW, providing information about sights to see, pointing out interesting wildlife (most often bighorn sheep), and sharing exciting experiences. Recipients of information appreciated the help. "[The other visitors] gave me ideas of other areas to explore in [the] canyon," a visitor wrote. "We discussed [the] canyon and exchanged experiences...real nice people." Equipment used by visitors could become the basis of a satisfying encounter. "At Horse Creek Canyon Campsite [sic] another camper came down to our site to photograph the rising full moon," commented a visitor. "He used a hiking stick monopod which lead to an interesting discussion." Finally, foul weather prompted two groups of campers to share a sheltered campsite and an enjoyable interaction. "A young nice couple took us [into their cave

**TABLE 13**  
**Ranking of six types of groups**  
**that could be encountered in ACW<sup>1</sup>.**

GROUP <sup>2</sup>	PREFERENCE PARAMETER <sup>3</sup>
Hikers	0.51
Birdwatchers	0.36
Nude sunbathers	0.07
Horseback riders	0.05
Hikers with packstock	0.05
Hunters	0.01

<sup>1</sup>Rankings developed from paired picture comparison technique.

<sup>2</sup>All groups were depicted in threes (e.g. three hikers, three birdwatchers, etc.)

<sup>3</sup>Preference parameters were calculated from loglinear, quasi-independence models (Fienberg 1987; Fienberg and Larntz 1976). Each parameter is the relative strength of preference for an item in relation to the other parameters (e.g., hikers were preferred ten times more than horseback riders.)

campsite] from the rain,” recalled a visitor, “I was surprised they would trust us, not that they couldn’t but it is a good feeling that people can share a dry place and good conversation.”

Visitors also gained vicarious satisfaction from other visitors’ behavior. “A party of 12 teenagers were diving and swimming in the pool in Horse Camp Canyon,” recalled a visitor, “we watched them awhile and then we left.” Another visitor wrote that “it was nice to see others enjoying themselves.” One visitor enjoyed a particularly intimate vicarious experience. “I was exploring a cave above the main canyon when a loving couple played in the creek,” he wrote. “I didn’t mention it later when we talked.”

Although relatively few visitors had displeasing encounters, the list of negative behaviors far outstrips the list of positive behaviors. Noise--most often shouting and playing radios--was frequently mentioned as disturbing and offensive, as was consumption of intoxicating beverages and drugs. Some visitors reported that others had been rude to them. Behaviors interpreted as rude included not smiling or wishing to converse, being too much in a hurry, overstaying one’s welcome, demanding too much (e.g. requesting food from a visitor who did not wish to share any) and “owning” a desired resource (e.g. a campsite or a swimming hole) when other people wanted it. Interruptions of privacy were considered very objectionable by some visitors. “[In] Paisano Canyon, we were bathing in a pool and a group of seven came upon us with no sensitivity to our solitude,” lamented one respondent. Another visitor complained that people “came up close and stared at me as I painted.” Other objectionable practices included keeping a dirty campsite, bringing dogs into the wilderness area, and building a campfire.

Nudity was very problematic for some visitors. Particularly offensive were situations where the visitor could not escape close contact with the nude people. “Two men were sunbathing in the nude in the main canyon,” wrote a female visitor about a negative encounter, “people had to pass them.” Another visitor had difficulty hiking by a nudist group. “Two groups hiking out kept stopping and nude sunbathing and swimming, then packed up and passed us then stopped and repeated [the] same behavior. We kept encountering them with great embarrassment and displeasure.” Conversely, for some nude sunbathers and swimmers, people who interrupted or even objected to their behavior were offensive. “An extremely large group of scouts encountered us while [we were] skinnydipping,” noted a visitor, “some might have been taken aback, but [they] showed no concern at the time.”



Nudity was an integral part of the experience for some visitors, and problematic for others.

Finally, for some visitors special behavior was not required for encounters to be disliked. Two female hikers, for example, felt threatened by a lone, male hiker: “[In the] main canyon near [the] west entrance my friend and I...encountered a man on the other side of the creek from us and I felt uncomfortable--sensed he posed a threat to us. He did not bother us, however.” Another visitor, who had a rather extreme opinion about encountering other people in the wilderness area, probably found all contacts intolerable: “one should not expect to see, meet, or have anyone in a wilderness area, regardless of the situation.”

## SUMMARY AND CONCLUSIONS

In many ways, the visitor population at ACW is typical of wilderness visitor populations throughout the United States. It is middle aged, predominantly male, and highly educated.<sup>20</sup> Corresponding to its educational attainment, the population is composed of people in middle to upper income brackets who are primarily employed in professional and managerial occupations. Presumably, this kind of population has related personal attitudes: it values solitude, for example, and is interested in conservation issues (as evidenced by their membership rates in conservation organizations). In other ways, the visitor population at ACW is atypical. Greater numbers of females, more first time visitors, and fewer students visit ACW than other wildernesses. “Consuming” visitors are almost absent: fishermen are missing and hunters are rare (in the more heavily visited zones of the wilderness).<sup>21</sup>



Notwithstanding these similarities, dissimilarities, and generalizations, though, Aravaipa's visitors come from a variety of personal backgrounds and, thus, have diverse tastes for outdoor recreation. They express these tastes in a spectrum of recreation behaviors and styles. Varied styles lead to varied types of interactions between visitors, and individual tastes lead to varied interpretations of these interactions. Some interactions are interpreted as pleasant by all parties, some are labelled unpleasant by one or more parties. When interactions are unpleasant, conflicts between users can arise.

In the following conclusions, we highlight differences within the visitor population, notesome areas of existing and potential conflict (and harmony) among the visitors, and point out management implications.

1. Simply stated, visitors have different needs for social interaction in ACW. To visitors who strongly desire solitude, nearly all interactions are considered an anathema. To other visitors who may be more insecure in the wilderness environment, interactions are welcome and pleasant. Most visitors fall in between these two extremes and are unconcerned about small amounts of social interaction. Nevertheless, management actions that change the current frequency of social interaction in ACW will benefit visitors at one extreme of social contact preferences at the expense of visitors at the other extreme.
2. To most users, encounters with large groups are much less acceptable than encounters with small or moderate-sized groups. This attitude held for campsite and trail encounters. No experiential impact could be associated with such encounters, though. For example, no association was found between encounters with large groups and changes in feelings of solitude (except as expressed through numbers of social contacts). Regardless, strong sentiments against large groups indicate an area of potential conflict between visitors.
3. Encounters with horseback riders and packstock users are similarly deplored. Negative attitudes toward use of recreational livestock appear to be founded in the belief that they cause extensive damage to trails and other features of the wilderness area. Predictably, preferences against encountering horses and packstock were associated with members of conservation organizations. Although such strong feelings reveal an underlying conflict between users, horse and packstock use is currently so minimal as to nullify any negative effects. Should such use increase, however, greater conflict may arise.
4. Nudity is problematic in ACW. For some visitors, nude sunbathing and swimming are necessary for experiencing wilderness in an intimate and natural manner. For other visitors, nudity is simply a fun experience, a way of staying cool during a hot spell, or a necessity for personal hygiene during a camping trip. On the other hand, for a significant number of visitors, encountering nude people during a visit to ACW is embarrassing, distasteful, and offensive. Because of its small size and relatively high use levels, and because the water bodies that attract nudists also attract most other types of visitors, interactions between nudists and anti-nudists in ACW is inevitable and the potential for conflict is high.
5. Hunters, as a user group, are almost unanimously disliked by Aravaipa's visitors. Fortunately, given the intensity of feelings against hunters, few visitors ever encounter hunters. Most hunters use the rimlands, a zone that is only rarely visited by the mainstream of Aravaipa's visitors. Furthermore, a ban on discharge of firearms in the main canyon also discourages hunters from using this heavily visited zone. Consequently, an informal zoning system is currently keeping hunters and non-hunters separated and conflicts to a minimum.
6. As demonstrated in chapter 3, social contacts negatively influence attainment of certain kinds of recreational experiences in ACW. But, qualitative results from the questionnaire indicate that most social interactions are enjoyable events. In searching for the

conflicting aspects of recreational use, we must not forget the important role of ACW as a setting for social communion between groups of visitors.

7. In addition to norms for frequencies of contact and sizes and types of groups to be encountered in ACW, visitors have norms regarding acceptable wilderness etiquette. Behaviors which violate this etiquette become bases for conflict. As indicated in the body of the chapter, some nuances of acceptable behavior are rather subtle (e.g. some visitors commented on the way other people waved or greeted them). Only some forms of depreciative behavior (such as bringing dogs into the wilderness area or discharging firearms), though, can be directly influenced by management. Most other forms simply reflect the intricacies of social interactions in nearly any setting.

In the research summary (pages i-ix), we address these conclusions in light of the results from chapters 5 and 6 and make management recommendations. Now, we move on to discuss the physical and biological setting of Aravaipa Canyon Wilderness.

## ENDNOTES

1. Two percent of the questionnaires were completed by a male and female together.
2. Some of these differences may be explained by inflation.
3. The difference is not, however, statistically significant at  $p < .05$ .
4. This could be a debatable statement. When asked to list wilderness areas they normally visit in Arizona, many visitors listed places that are not official wilderness areas. For instance, the Grand Canyon, Havasupai Canyon, state parks, and Ramsey Canyon (a Nature Conservancy preserve) were listed.
5. All of the activities in this sentence except horseback riding and hunting were listed under the "other" category of question 56 (see appendix 1).
6. This is an interesting fact since most wilderness areas do not have a three-day stay limitation.
7. Compared to data in Roggenbuck and Lucas (1987).
8. Spring is probably the most pleasant time to visit ACW. Summer is very hot; there is less water available in the Fall; and Winter can be cold and rainy.
9. See question 5, appendix 1.
10. The statistical distribution of contact preferences for the large group derived from picture interviews is significantly different from the distribution derived from the mail questionnaire (using Mann-Whitney U test,  $p < .05$ ).
11. Horseback riders and hikers with packstock had identical rank.
12. The relationship was modelled with a logit equation ( $L2=1.085$ ,  $df=4$ , and  $p=.897$ ). The equation is

$$\ln(F_{1111}/F_{2111}) = -.104 + .170\text{GENDER} + .230\text{MEMBER} + .048\text{FAMILY},$$

where  $\ln(F_{1111}/F_{2111})$  = the log odds of accepting 0 vs. 1 or more contacts with horseback riders; GENDER=1 for a male and 2 for a female; MEMBER=1 if a member of a



conservation group and 2 if not member; and FAMILY=1 if with family and 2 if not with family. All associations between the independent variables were controlled in this analysis. [ $*p<.001$ ]

13. Contact preferences for meeting large groups were compared using a logit model against race, group size, and number of children travelling in the party ( $L^2=2.080$ ,  $df=2$ ,  $p=.353$ ). The equation was:

$$\ln(F_{1111}/F_{2111}) = -.348-.460RACE+.046SIZE+.416*CHILD,$$

where  $\ln(F_{1111}/F_{2111})$ =the log odds of preferring zero vs. 1 or more contacts with a large group; RACE=1 for whites and 2 for nonwhites; SIZE=1 for a group size of 1-2 people and 2 for a size of 3 or more people; and CHILD=1 for children present and 2 for children not present. (The model was run with SIZE dichotomized as 1-7 people and 8 or more people with similar results.) [ $*p<.01$ ]

14. These odds were estimated using a logit model with acceptable contacts with nudists being the dependent variable and gender, age, whether children were present, and whether the group was a family or not as the independent variables ( $L^2=24.51$ ;  $df=22$ ;  $p=.321$ ). The equation for the log-odds of zero vs. 1-2 contacts ( $\ln F_{1111}/\ln F_{2111}$ ) was:

$$\ln F_{1111}/\ln F_{2111} = -.112-.156GEN+.225CHILD-.390AGE-.076FAM$$

and for 1-2 vs. 3 or more contacts ( $\ln F_{2111}/\ln F_{3111}$ ), the equation was:

$$\ln F_{2111}/\ln F_{3111} = 1.151-.519GEN+.285CHILD-.087AGE+.070FAM,$$

GEN=1 for male and 2 for female; AGE=1 for <37 years and 2 for > 36 years; CHILD=1 for children with group and 2 for no children; and FAM=1 for family group and 2 for other than family. All interactions between the independent variables were controlled in the analysis.

15.  $p<.05$  for the solitude comparison and  $p<.10$  for the untamed wilderness comparison.
16. Three logit equations ( $L^2=2.580$ ,  $df=2$ ,  $p=.275$ ) of interest are

$$\ln(F_{111}/F_{211}) = 3.624^b-.100GROUP+.886*CONTACTS, \quad (1)$$

$$\ln(F_{121}/F_{221}) = 3.624^b-.262GROUP+.886*CONTACTS, \quad (2)$$

$$\text{and } \ln(F_{131}/F_{231}) = 3.624^b-.362GROUP+.886*CONTACTS, \quad (3)$$

where  $\ln(F_{111}/F_{211})$ =the log odds of reporting a very strong to strong vs. a moderate to none feeling of solitude; GROUP=the size of the largest group encountered during the visit (0-4, 5-9, or 10+ people); and CONTACTS=the number of groups encountered during the visit (0-2 or 3+ contacts). Equations (1), (2), and (3) differ according to the size of the group encountered [(1) is for a group size of 0-4; (2) for a group size of 5-9; and (3) for a group size of 10+]. In each equation, if the level of contacts exceeded two, the CONTACTS coefficient would change sign. All interactions between the independent variables were controlled in this analysis. [ $*p<.005$ ;  $^b p<.001$ ]

17. Three logit equations ( $L^2=.535$ ,  $df=2$ ,  $p=.765$ ) of interest are

$$\ln(F_{111}/F_{211}) = 3.624^b-.088GROUP+.286*CONTACTS, \quad (1)$$

$$\ln(F_{121}/F_{221}) = 3.624^b+.436GROUP^1+.286*CONTACTS, \quad (2)$$

$$\text{and } \ln(F_{131}/F_{231}) = 3.624^b+.348GROUP+.286*CONTACTS, \quad (3)$$

where  $\ln(F_{111}/F_{211})$ =the log odds of reporting a very strong to strong vs. a moderate to none feeling of untamed wilderness; GROUP=the size of the largest group encountered during the visit (0-4, 5-9, or 10+ people); and CONTACTS=the number of groups encountered during the visit (0-2 or 3+ contacts). Equations (1), (2), and (3) differ according to the size of the group encountered [(1) is for a group size of 0-4; (2) for a group size of 5-9; and (3) for a group size of 10+]. In each equation, if the level of contacts exceeded two, the CONTACTS coefficient would change sign. All interactions between the independent variables were controlled in this analysis. In each equation, if the level of contacts exceeded two, the CONTACTS coefficient would change sign. [ $p<.01$ ;  $p<.001$ ]

18. In these analyses, feelings of danger and feelings of unspoiled wilderness (both from question 25) were recoded to strong/weak dichotomies. Encounters with hunters and horseback riders were recoded into “about what I prefer/more than I prefer” dichotomies. Thus, numbers of encounters in relation to respondents’ preferences were used in place of absolute numbers of encounters.
19. Some respondents reported that they saw *fewer* nudists than they prefer. Responses such as this (and to other parts of question 30) have caused us to qualify the validity of question 30 (see chapter 2).
20. In this section we assume that our sample of permit holders is representative of the general visitor population at ACW. See Holland, Fedler, and Ditton (1986) for a discussion on group representative bias. (Also, see chapter 2 for a discussion of our sampling methods.)
21. Fishermen are not present because game fish are absent from Aravaipa Creek. Hunters are effectively excluded from the canyon corridor by order one of the Arizona Game and Fish Department: “The flood plain of Aravaipa Creek and the first 50 vertical feet above the stream bed are open to hunting with bow and arrow only” (Arizona Game and Fish Department 1988-1989:17).



## 5. PHYSICAL-BIOLOGICAL SETTING

*Wilderness has a deceptive concreteness at first glance. The difficulty is that while the word is a noun it acts like an adjective. There is no specific material object that is wilderness. The term suggests a quality (as the “-ness” suggests) that produces a certain mood or feeling in a given individual and, as a consequence, may be assigned by the person to a specific place (Nash 1982:1).*

If an informal poll were taken on a street corner, most people would probably describe wilderness in terms of land, animals, vegetation, and water. Few would mention social or managerial conditions except, possibly, as intrusions into an otherwise perfect setting. Culturally, this is the way they have been socialized to understand wilderness. Consequently, the physical and biological attributes of a wilderness exert strong forces on visitors. People expect wilderness to be a certain way and to produce certain feelings. Moreover, they assign particular feelings to individual wildernesses and even parts of wildernesses.

In this chapter, we examine the feelings that people assign to Aravaipa Canyon Wilderness and the characteristics that help produce those feelings. First, we identify those physical and biological attributes of the wilderness that were important to our survey respondents. Under the umbrella of physical and biological attributes we include the water, wildlife, soils, air, climate, geology, and wildlife of ACW and impacts to some of these attributes associated with recreational use. We also include as attributes indirect “social” interactions affected through litter, graffiti, damage to vegetation, campfires, and overflights by planes.

After identifying important attributes, we then examine how visitors used ACW and what areas of the wilderness were most popular. After that, we assess the kinds of experiences people derived during visits to ACW and explore how they perceived the quality of specific physical and biological attributes. Finally, we evaluate how changes in physical and biological attributes affected visitors’ perceptions of ACW and whether particular use zones held different qualities for visitors.

### IMPORTANT PHYSICAL AND BIOLOGICAL ATTRIBUTES OF THE SETTING

We asked mail questionnaire respondents to express how much they would like to encounter 18 physical and biological attributes of ACW (question 2, see appendix 1). We also asked them how much they would like to participate in 26 activities that are dependent on various physical or biological attributes of the wilderness area (question 3, see appendix 1). We viewed favorable or unfavorable ratings of these activities as reflecting underlying attitudes toward the attributes. From responses to these questions, we compiled a table of attributes that either enhance or detract from visitors’ recreation experiences (table 1).

Five kinds of attributes--litter along travel routes, litter at campsites, graffiti, human feces or toilet paper, and low-flying aircraft--received strong negative evaluations from the sample. We labeled these attributes “strong detractors” (table 1), assuming that visitors would accept little or no contact with these attributes. Another set of attributes received evaluations that were not as negative as the strong detractors. This set was labelled, simply, “detractors” (table 1). Detractors included manure from livestock, damaged trees or other vegetation, campsites concentrated in camp areas, and three impacts associated with campfires: charred logs and ash, light from other visitors’ campfires, and smoke.



**TABLE 1**  
**Attributes of Aravaipa Canyon Wilderness that would detract from,**  
**enhance, or both detract from or enhance respondent's recreational experiences.**

<b>STRONG DETRACTORS<sup>1</sup></b>	<b>STRONGLY DISLIKE</b>	<b>STRONGLY DISLIKE</b>	<b>NEUTRAL</b>	<b>LIKE</b>	<b>LIKE</b>	<b>N</b>
Litter along travel routes	96.0%	2.5%	0.7%	0.0%	0.8%	658
Litter at campsites	95.9	2.8	0.6	0.0	0.7	658
Graffiti on rocks, trees, etc.	95.2	3.8	0.3	0.0	0.7	658
Human feces or toilet paper on the ground	89.3	8.3	1.5	0.0	0.9	656
Aircraft flying low overhead	68.7	19.7	10.6	0.6	0.5	657
<b>DETRACTORS<sup>2</sup></b>						
Manure from livestock	53.2	22.4	22.7	0.9	0.8	655
Damaged trees or other vegetation	40.9	22.3	30.7	3.7	2.4	648
Campsites concentrated in camp areas	29.8	32.4	20.7	10.6	6.5	652
Charred logs and ash from camp fires	22.4	36.3	37.2	3.0	1.2	653
Light from other visitors' campfires	18.0	26.6	45.3	8.5	1.6	649
Smoke from campfires	12.9	20.8	50.4	12.2	3.7	654
<b>DETRACTORS AND ENHANCERS<sup>3</sup></b>						
Toilet facilities at popular campsites	26.1	17.8	22.1	19.8	14.2	654
Rock fire rings at campsites	16.8	17.0	39.7	21.1	5.4	655
Maintained trails	13.5	19.2	23.4	29.5	14.5	657
Seeing a flood in ACW	28.3	15.3	25.2	18.8	12.3	653
Interpretive or directional signs at points of interest	14.7	14.6	18.2	32.7	19.8	657
<b>ENHANCERS<sup>4</sup></b>						
Drinking water from Aravaipa Creek	9.7	13.5	22.7	27.4	26.6	657
Climbing rocks	1.3	7.2	32.4	29.6	29.4	654
Cattle fences at wilderness boundaries	3.5	5.1	28.9	26.9	35.7	655
Campsites dispersed throughout ACW	9.3	9.3	15.5	36.7	29.2	651
Observing and identifying fish	0.0	1.3	28.7	36.4	33.6	656
Sitting around a campfire	2.8	2.6	18.4	33.0	43.3	659
Swimming in Aravaipa Creek	1.2	1.9	18.6	31.5	46.7	655
Hiking to the canyon rim	0.6	1.9	17.5	35.7	44.2	654
Identifying plants	0.0	0.9	17.3	41.0	40.7	658
Photographing animals	0.5	0.4	15.5	27.4	56.2	658
Observing and identifying birds	0.3	0.5	15.4	35.5	48.4	657
Studying archeological artifacts	0.6	0.8	14.3	37.8	46.5	654
Examining the geology	0.1	0.6	13.3	39.7	46.2	657
Swimming in pools in side canyons	1.4	1.6	11.9	32.6	52.5	650
Observing and identifying reptiles and amphibians	0.0	1.1	11.6	41.0	46.3	656
<b>STRONG ENHANCERS<sup>5</sup></b>						
Photographing the scenery	0.4	0.6	8.9	23.5	66.6	657
Walking in Aravaipa Creek	0.3	1.5	3.5	18.1	76.6	658
Observing and identifying mammals	0.0	0.1	3.2	30.4	66.3	657
Hiking in side canyons	0.1	0.6	2.5	20.4	76.4	657

<sup>1</sup> ≥ 85% of the respondents strongly disliked or disliked strong detractors.

<sup>2</sup> ≥ 40% but < 90% of the respondents disliked or strongly disliked and ≤ 20% liked or strongly liked detractors.

<sup>3</sup> ≥ 20% of the respondents disliked or strongly disliked and ≥ 20% liked or strongly liked attributes that were detractors and enhancers.

<sup>4</sup> ≥ 40% but < 90% of the respondents liked or strongly liked and ≤ 20% disliked or strongly disliked enhancers.

<sup>5</sup> ≥ 90% of the respondents liked or strongly liked strong enhancers.

Numerous attributes provided settings or foci for popular recreational activities. These attributes fell into the "enhancers" and "strong enhancers" set (table 1). Water, for example, was the site of many enjoyable activities, including walking and swimming in Aravaipa Creek and swimming in side canyon pools. Mammals, reptiles, amphibians, birds, plants, and fish--popular subjects for

nature study, observation, and photography--also were enhancers. Other important enhancers were side canyons and the rimlands (for reasons discussed later in the chapter), geological features (for study and rock climbing), dispersed campsites (which presumably promote privacy), and cattle fences (for reasons discussed in chapter 6). Ambiguously, although their impacts were disliked by most respondents, campfires received high marks as a campsite activity. Consequently, fires appear as an enhancer in table 1.

Several attributes were detracting for some visitors and enhancing for others. These ambivalent attributes were listed as "detractors and enhancers" (table 1). Except for floods and firings, "detractors and enhancers" resulted from direct management actions: toilet facilities at popular campsites, maintained trails, and interpretive or directional signs at popular campsites. (See chapter 6 for a discussion of management activities.) Floods made the detractor list of many respondents because they are life threatening hazards. On the other hand, they made the enhancer list of other respondents because they are exciting natural processes.<sup>1</sup> Rock fire rings were unpopular with visitors who regard them as manmade intrusions in an otherwise natural setting. Nonetheless, rings were popular with visitors who believe that they denote proper places to camp.<sup>2</sup>

To compare important attributes in different parts of the wilderness, we divided the area into three zones and asked visitors to name the most important attribute of each zone (questions 26, 38, and 46). The three zones followed topographic demarcations in the wilderness and were named the canyon corridor zone, the side canyons zone, and the rimlands zone (figure 1). Aravaipa Canyon, from the west trailhead to the east trailhead, was the canyon corridor zone. This zone included Aravaipa Creek, its banks, and the relatively level lands on each side of the creek up to the canyon walls. For the canyon corridor zone, water, peace and quiet, solitude<sup>3</sup>, wildlife, and geology were, respectively, ranked first, second, third, fourth, and fifth (table 2). The side canyon zone comprised all of the nine side canyons feeding into Aravaipa Canyon: Hell's Half Acre Canyon, Painted Cave Canyon, Javelina Canyon, Virgus Canyon, Horse Camp Canyon, Booger Canyon, Paisano Canyon, Hell Hole Canyon, Parson's Canyon. The attribute rankings were different for this zone than the corridor zone; this time solitude achieved first rank followed by water, peace and quiet, geology, and challenge.

The rimlands zone, which comprised all other lands in the wilderness area, included the table lands abutting each rim of Aravaipa Canyon and, in the perception of many visitors, the upper benches of the walls of the main canyon. With respect to the rimlands zone, the rank order of attributes was solitude, challenge, wildlife, water<sup>4</sup>, and peace and quiet.

Confirming our suspicions, solitude was ranked as a more important attribute in the side canyon and rimlands zones than in the corridor zone. This result suggests that visitors regard the side canyons and rimlands as refuges from the more heavily visited canyon corridor. Additionally, challenge, which was ranked in the top five attributes of the side canyons and rimlands zones, did not achieve similar ranking in the canyon corridor zone. Similarly wildlife was highly ranked in the corridor and rimlands zones, but not so in the side canyons zone.

Reasonably, then, because visitors recognize different qualities in each of the three zones (and because these zones objectively have unique physical, biological, and social characteristics) the zones represent, in the terminology of the Recreational Opportunity Spectrum system (Clark and Stankey 1979), different opportunity classes. In an upcoming section of this chapter, we take the next step and examine whether visitors derived different recreational experiences in each zone at ACW.



The canyon corridor zone

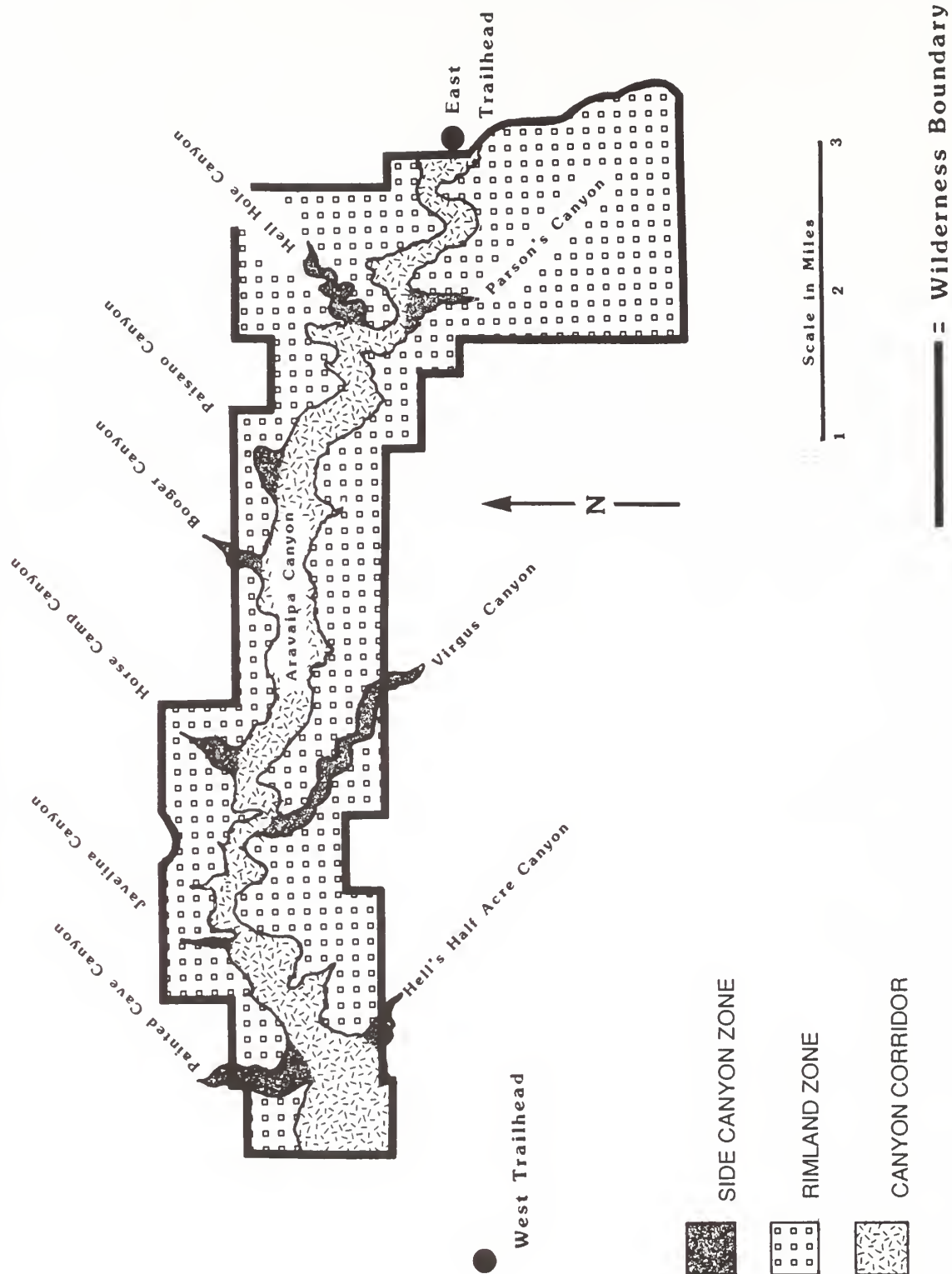


The side canyons zone



The rimlands zone

# ARAIPA CANYON WILDERNESS





## SPATIAL USE PATTERNS ENTRY POINT, DESTINA- TIONS, AND CAMPSITES

Approximately 64% of the visitors entered ACW from the west trailhead and 36% entered from the east. The majority of visitors from the west trailhead (58%) travelled as far as the region around Horse Camp Canyon--a distance of about five miles (figure 2). Nearly all west end visitors hiked to the first side canyons on the west side (Hell's Half Acre Canyon and Painted Cave Canyon). Few west side visitors hiked the entire canyon; only 5.5% made it all the way to the east entrance. East end visitors travelled about the same distances as west end visitors. Approximately 53% made the five mile excursion to Booger Canyon and nearly all visitors made the shorter hikes to Hell Hole and Parson's Canyons. As with west end visitors, only 6% of the people embarking from the east end toured the entire canyon.

One interesting phenomenon to be noted from figure 2 is the zoning influence of distance: relatively few visitors starting from each entrance crossed paths. Only 31% of west end visitors travelled farther than Horse Camp Canyon, and only 36% of east end visitors ventured beyond Booger Canyon. Consequently, ad hoc "west entrance" and "east entrance" use zones were established in the wilderness by visitors' behavior patterns.

**TABLE 2**  
Ranking of the most important elements  
of the main canyon, side canyon, and rimlands.

	MAIN CANYON		SIDE CANYON		RIMLANDS	
	%	RANK	%	RANK	%	RANK
Water	33.4	1	23.4	2	12.8	4
Peace and quiet	23.2	2	15.2	3	12.7	5
Solitude	16.4	3	23.8	1	19.4	1
Wildlife	8.7	4	8.8	6	15.8	3
Geology	6.9	5	11.3	4	8.3	6
Challenge	3.0	6	8.9	5	16.2	2
Vegetation	2.6	7	3.8	7	6.8	7
Ease of Hiking	2.3	8	2.3	8	1.5	10
Good campsites	1.6	9	0.0	13	2.3	9
Shade	1.4	10	1.9	9	2.8	8
Safety from natural hazards	0.4	11	0.0	13	0.0	13
Archeology	0.2	12	0.6	10	1.5	11
Meeting other visitors	0.0	13	0.0	13	0.0	13
N = 545			N = 355		N = 65	

**FIGURE 2**  
Destinations achieved<sup>1</sup> by visitors  
beginning from each entrance to ACW

WEST BOUNDARY	HELL'S HALF ACRE CANYON	PAINTED CAVE CANYON	JAVELINA CANYON	VIRGUS CANYON	HORSE CAMP CANYON	BOOGER CANYON	PAISANO CANYON	HELL HOLE CANYON	PARSON'S CANYON	EAST ENTRANCE
% of visitors reaching each destination from the west entrance.										
100%	97.7	93.2	88.5	76.2	58.0	31.4	20.9	16.1	8.2	5.5
6.1	6.9	8.2	13.8	25.1	36.4	52.7	68.5	90.2	97.8	100%
% of visitors reaching each destination from the east entrance.										

<sup>1</sup> A destination is the farthest point from the origination point.

Destinations were estimated from question 23 (appendix 1).

<sup>2</sup> N=332.

<sup>3</sup> N=188.



**TABLE 3**  
**Campsite selections<sup>1</sup> by visitors by entrance**

MAIN CANYON DESTINATION ZONE	WEST ENTRANCE		EAST ENTRANCE	
	CAMPSITE ONE LOCATION	CAMPSITE TWO LOCATION	CAMPSITE ONE LOCATION	CAMPSITE TWO LOCATION
West Boundary of Wilderness	3.7	1.3	0.8	0.0
Hell's Half Acre Canyon	3.7	6.5	0.0	1.1
Painted Cave Canyon	6.3	7.8	0.8	0.0
Javelina Canyon	19.0	13.0	0.8	0.0
Virgus Canyon	25.4	23.4	5.5	6.6
Horse Camp Canyon	31.7	29.9	9.4	12.0
Booger Canyon	6.8	9.1	7.9	17.0
Paisano Canyon	2.2	2.6	14.2	11.5
Hell Hole Canyon	0.0	5.2	40.2	31.7
Parson's Canyon	0.5	0.0	14.2	7.6
Rimlands	0.5	1.3	0.8	0.0
Turkey Creek Canyon	0.0	0.0	5.5	9.0
	N = 189	77	97.2	96.5

<sup>1</sup>Campsite choices were determined from question 23 (see Appendix 1).

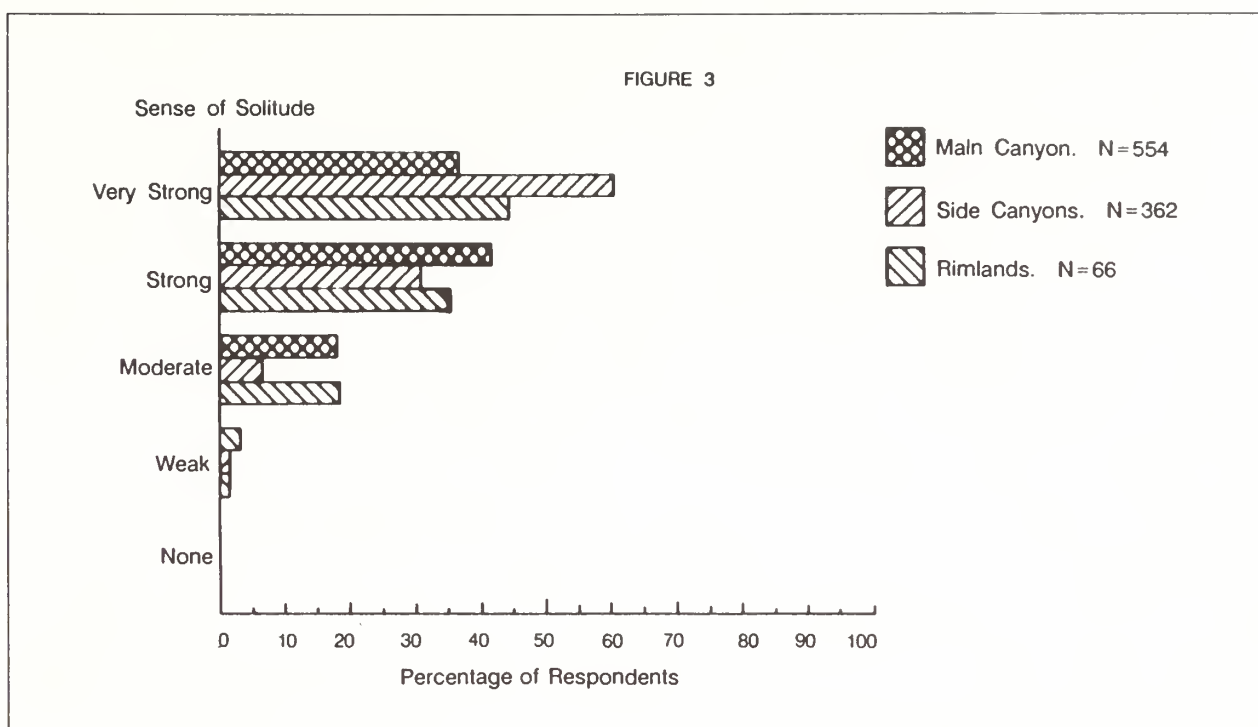
Also conforming to the "ad hoc" zoning system was campsite selection. Most campers entering from the west trailhead congregated around Javelina, Virgus, and Horse Camp Canyons (table 3). East end campers preferred Booger, Paisano, Hell Hole, and Parson's Canyons. Overlap primarily occurred at Horse Camp Canyon, the psychological midpoint of the wilderness area. Ten percent or fewer of the backpackers from either trailhead camped beyond this imaginary boundary line.

## VISITATION OF CANYON CORRIDOR, SIDE CANYON, AND RIMLANDS ZONES<sup>5</sup>

Logically, because access to the side canyons and rimlands zones requires (in most instances) travelling through the main canyon, 97% of the visitors reported having visited the main canyon zone (question 24, appendix 1). The three percent who claimed to not have visited the main canyon zone probably only hiked a short distance from the west trailhead, visited only Turkey Creek Canyon on the east boundary, accessed the wilderness area from hiking trails out of Turkey Creek Canyon, or travelled to the rimlands on one of the jeep roads to the north and south of the wilderness area. Sixty-three percent of the visitors ventured out of the corridor zone and explored at least one side canyon (question 35, appendix 1). Predictably, Virgus, Horse Camp, and Hell Hole Canyons, the most prominent side canyons in the wilderness area, were also most popular. Only 12% of visitors reported that they trekked to the rimlands zone (question 44, appendix 1). Judging from comments provided by visitors, most excursions to the rim began at Hell Hole Canyon, on the "dugway trail" between Paisano and Hell Hole Canyons, and from Turkey Creek Canyon (see figure 1). These figures confirm our representation of the main canyon as the focus of most recreational use with other zones receiving progressively smaller amounts of visitation.

## EVALUATION OF PHYSICAL AND BIOLOGICAL ATTRIBUTES OF THE SETTING

**WILDERNESS EXPERIENCES** In each zone of ACW, visitors rated the quality of eight kinds of recreational experiences derived in that zone (questions 25, 36, and 45, appendix 1). Experiences which are related primarily to social contacts, solitude and freedom, were rated highly in all zones of the wilderness (figures 3 and 4). "Sense of discovery" was also highly rated (figure 5), which is not surprising since 50% of the visitors were there for the first time.<sup>6</sup> But experiences more



related to the quality of physical and biological attributes received lower ratings. Substantial numbers of ratings in the moderate and weak categories of “feeling of untamed wilderness” (figure 6), “feeling that no one had been there before” (figure 7), and “feeling of unspoiled wilderness” (figure 8), indicate that many visitors perceived wear and tear on ACW’s resources. In a later section of this chapter, we pinpoint the conditions that could be resulting in lower ratings of these experiences.

Reflecting the benign nature of Aravaipa Canyon, visitors reported, at most, moderate feelings of danger (figure 9), and strong or very strong feelings of security (figure 10). Aravaipa, indeed, did not intimidate its visitors.<sup>7</sup>

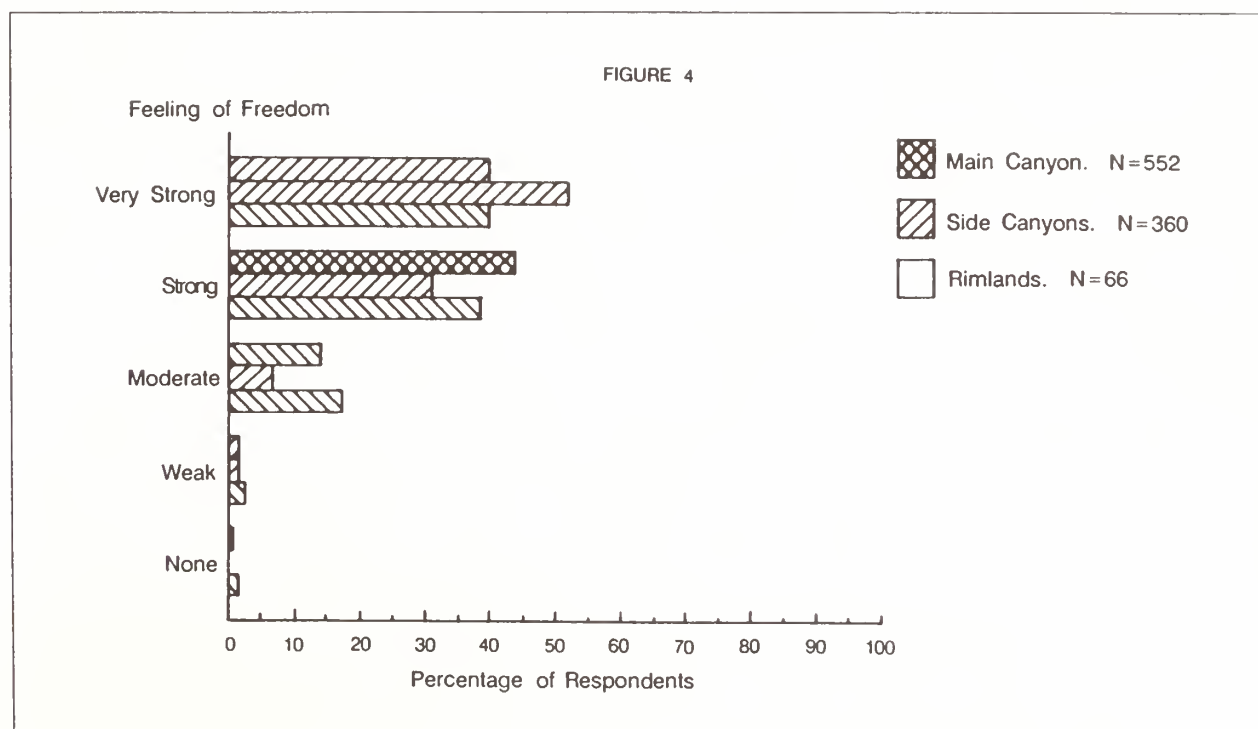
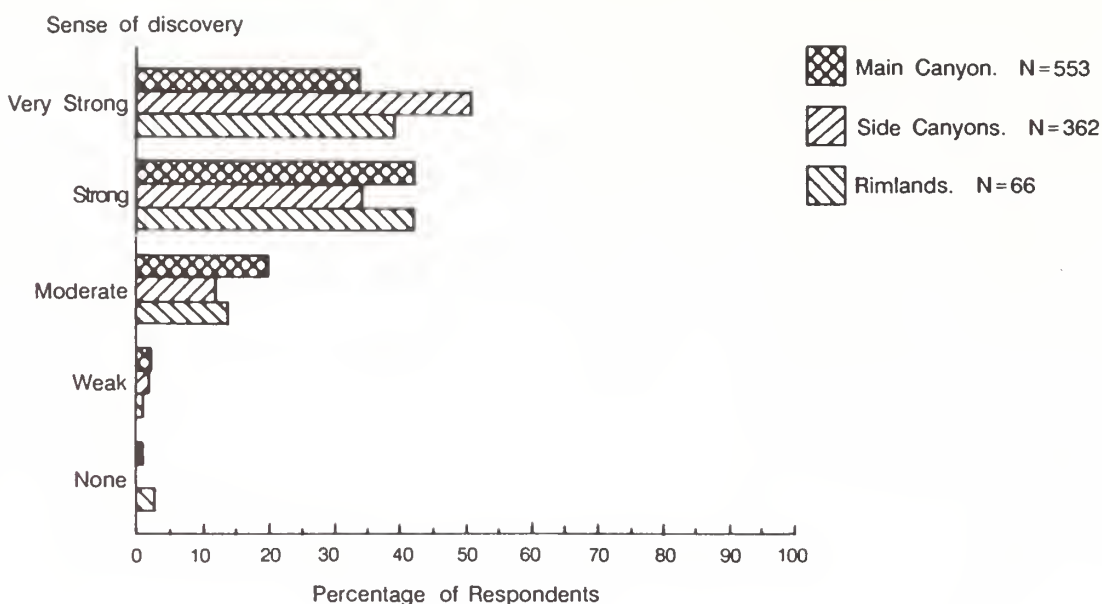
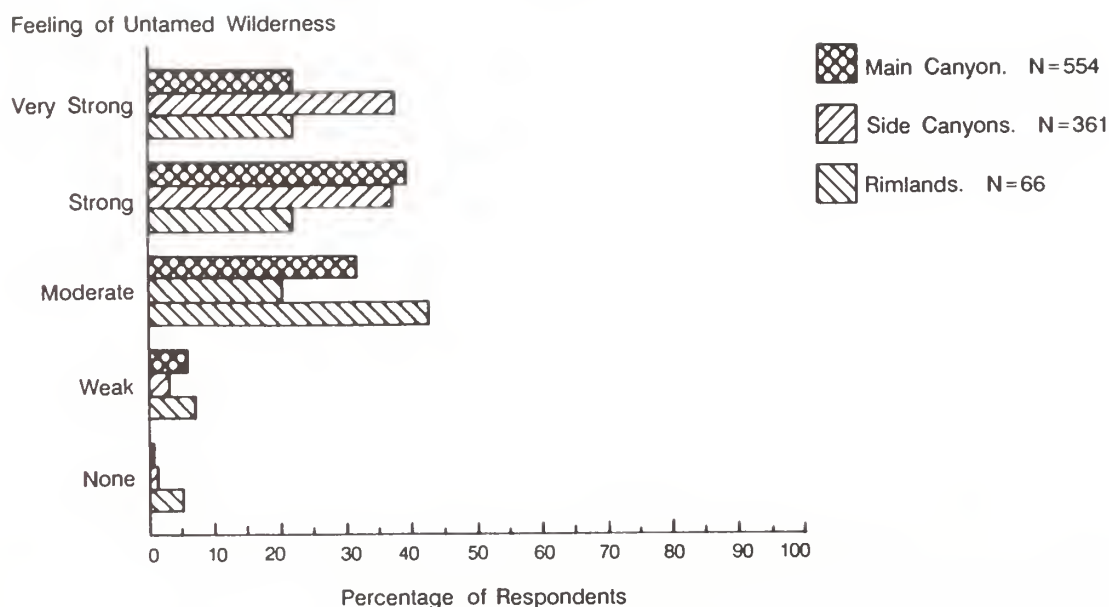


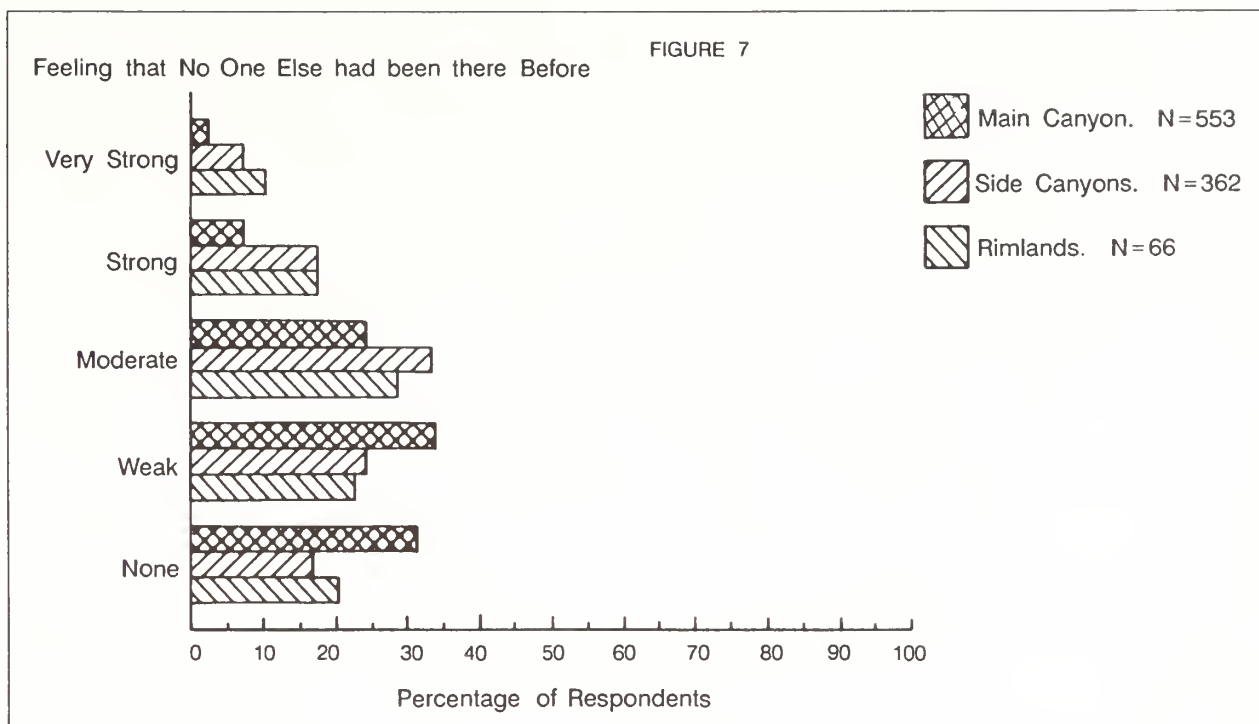
FIGURE 5



**CONDITIONS ENCOUNTERED** In table 4 we summarize visitors' appraisals of the occurrence, in the canyon corridor zone, of eight "detractors" (damaged trees or other vegetation; manure from livestock; human feces or toilet paper on the ground; litter; graffiti on rocks, trees, etc.; manmade structures; evidence of campfires; and low flying aircraft); two "enhancers and detractors" (firerings and water); and one "enhancer" (wildlife). For six of the eight detractors, considerable numbers of people encountered more of the attributes than they prefer: 21.9% of the visitors encountered more damaged trees or other vegetation than they prefer; 33.1%, livestock manure; 24.9%, feces or toilet paper; 32.5%, litter; 30.7%, evidence of campfires, and 25%, low flying aircraft.

FIGURE 6





Objectively, only damaged trees (primarily from floods, though cut branches may be found in camp areas), evidence of campfires (burnt logs and ash), and overflights (by private and military aircraft) are encountered in the wilderness to any significant degree. Livestock manure is only infrequently encountered, because cattle are excluded from the canyon corridor (except for rare, small cattle drives on the east end) and horseback use is minimal. Neither is litter nor other human wastes frequently found (except around popular campsites). Regardless, even limited numbers of encounters with manure, litter, and human wastes were extremely distasteful to the respondents, though, and thus very noticeable and significant.<sup>8</sup>

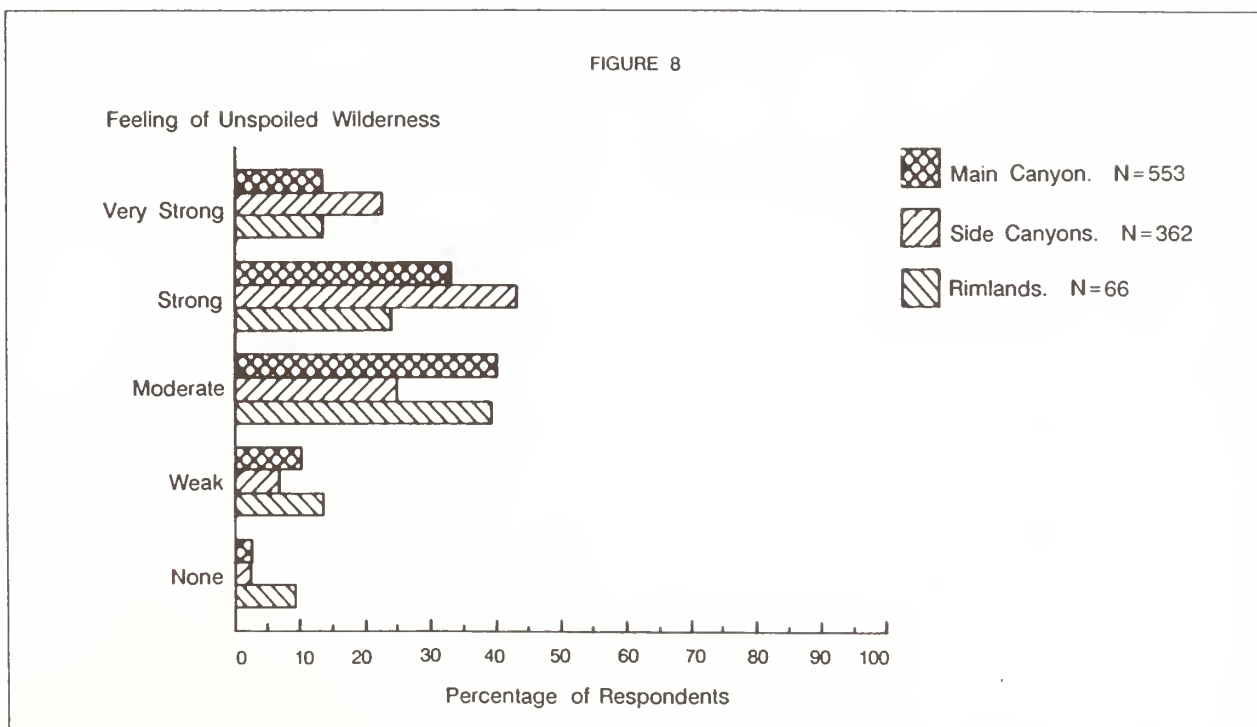
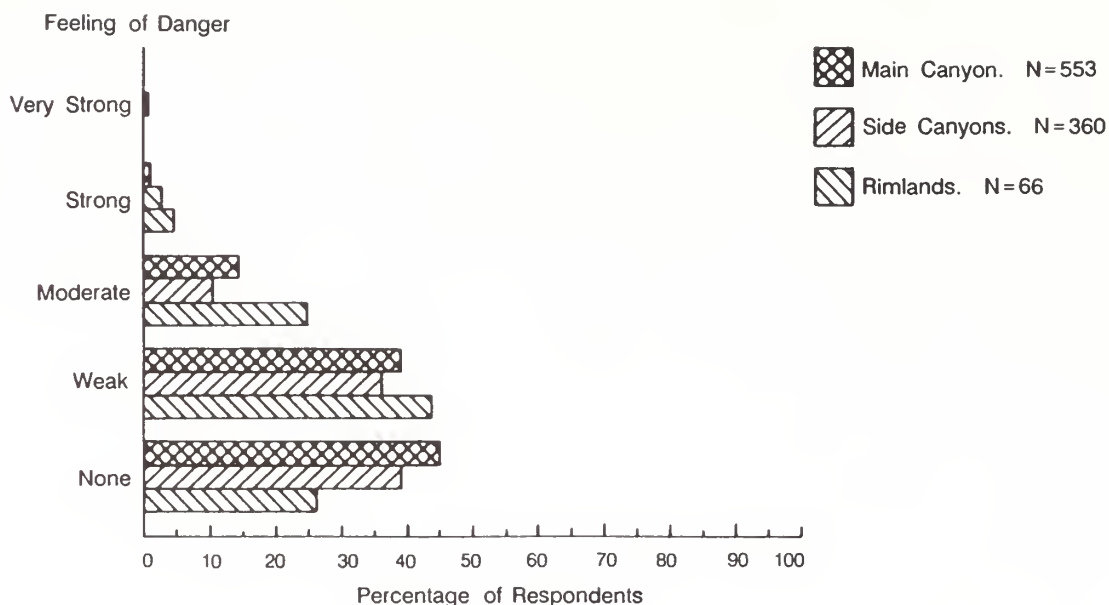




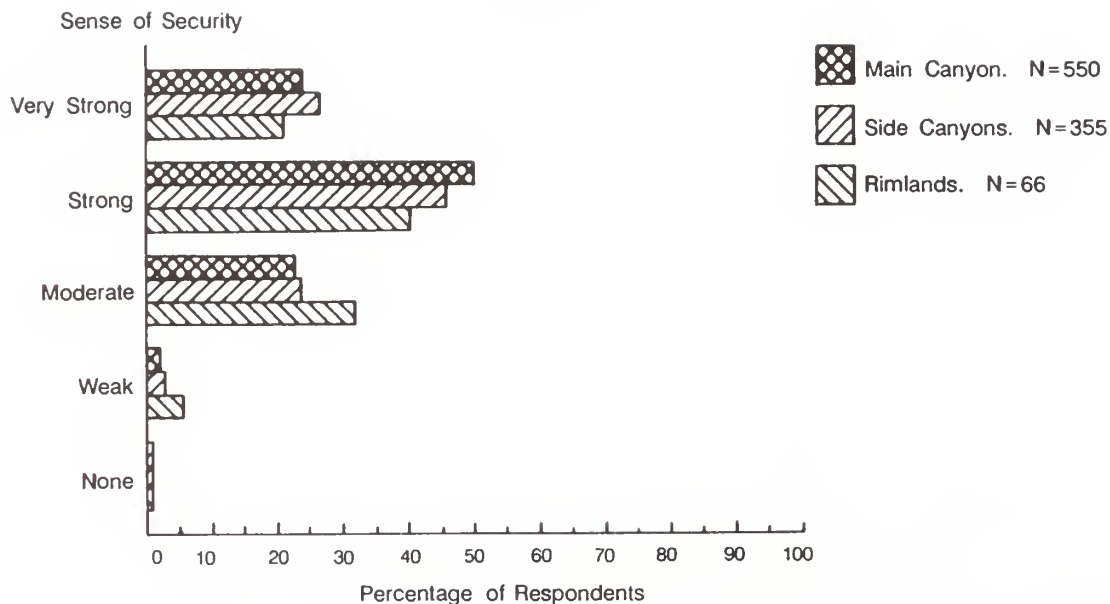
FIGURE 9



Of the two “detractors and enhancers”, only rock firings were more abundant than some people would have liked: 28% of the visitors encountered more firings than they prefer. Significantly, 67% of the visitors encountered less wildlife than they prefer. These visitors may have expected to see more wildlife than they did or they may have been inexperienced wildlife observers. Another possibility with significant management implications is that wildlife are actually displaced out of the canyon corridor and popular side canyons during heavy use periods.

**WATER QUALITY** Most visitors (greater than 90%) rated the water quality in Aravaipa Creek and in the side canyons “OK” to “very good” (table 5). Ratings for the main canyon and side

FIGURE 10



canyons were very similar, but not identical. Some visitors rated side canyon waters higher than those of the main canyon, but an equal number rated the main canyon waters higher.<sup>9</sup> Forty-eight percent of main canyon visitors drank water from Aravaipa Creek. Eighty-six percent of these visitors purified the water before drinking it. Boiling was the most popular purification method (used by 35.6% of the creek water drinkers), followed by iodine (29.4%), filtering (28.1%), and chlorine (6.9%).

Interestingly, although ratings of main and side canyon water sources were nearly identical, fewer people purified water from side canyon sources. Only 52% of side canyon water users (contrasted to 86% for the main canyon) purified their water. Supporting this behavior were comments by some visitors regarding "secret", clean water sources in certain side canyons (particularly Hell Hole Canyon). A statistical test, though, showed no association between the choice of side canyon for obtaining water and the decision to purify.<sup>10</sup> See table 6 for a listing of the frequency with which side canyon water sources were used.



Many visitors saw less wildlife than they prefer

**WATER QUANTITY** Some visitors reported that they had encountered either less water than they prefer (8.4% of the sample) or more water than they prefer (3.7% of the sample). These

**TABLE 4**  
Occurrence of 11 physical and biological conditions  
in relation to visitors' preferences.

PHYSICAL-BIOLOGICAL CONDITION	A LOT LESS THAN I PREFER	LESS THAN I PREFER	ABOUT WHAT I PREFER	MORE THAN I PREFER	A LOT MORE THAN I PREFER	N
Damaged trees or other vegetation	0.8	3.0	74.2	18.5	3.4	478
Manure from livestock	0.8	1.5	64.6	25.7	7.4	483
Human feces or toilet paper on the ground <sup>1</sup>	0.0	0.0	75.0	21.4	3.5	475
Litter	1.2	0.9	65.3	28.9	3.6	481
Rock fire rings	0.9	2.4	68.7	24.2	3.7	480
Graffiti on rocks, trees, etc.	2.2	1.2	87.8	7.6	1.2	469
Wildlife	14.1	53.1	31.1	1.3	0.4	486
Manmade structures	0.8	2.0	88.4	7.2	1.7	474
Evidence of campfires	0.5	1.7	67.1	26.5	4.2	482
Water	1.5	6.9	87.9	3.5	0.2	483
Low flying aircraft	0.8	0.6	73.7	18.8	6.2	475

<sup>1</sup>A small number of respondents indicated responses in the "a lot less than I prefer" and "less than I prefer" categories for this item. Their pattern of responses on other items indicated that they were applying scales used in questions 2, 3 and 5--"strongly dislike" to "strongly like" (see Appendix 1)--to this question. We deleted these cases from the analysis. Consequently, there are no responses on the "less than preferred" side of the feces item.

**TABLE 5**  
**Ratings of the water quality**  
**in Aravaipa Creek and in side canyon**  
**streams and pools.**

	ARAVAIPA CREEK	SIDE CANYON STREAMS AND POOLS
Very Good	24.5	25.4
Good	36.0	35.1
OK	30.8	29.7
Poor	7.2	8.1
Very Poor	1.5	1.7
	N = 544	359

perceptions were related to actual streamflows. For example, within a flow range of zero to 30 cubic feet per second (cfs), a unit decrease in flow increased the odds of seeing less water than preferred vs. acceptable amounts of water by 12%.<sup>11</sup>

## INFLUENCE OF PHYSICAL AND BIOLOGICAL ATTRIBUTES ON THE RECREATION CHOICES OF VISITORS

### INFLUENCE OF TEMPERATURE, RAINFALL, AND STREAMFLOW ON VISITATION

Using multiple linear regression, we attempted to predict monthly average visitation at ACW with three variables: (1) average monthly temperature (°F) and (2) precipitation (in.) in southeastern Arizona (the area around Tucson), and (3) average monthly

streamflow (cfs) in Aravaipa Creek near the San Pedro River.<sup>12</sup> Ten years of data (1975-1984) were included in the analysis. The final model,

$$\text{Avg. Mon. Vis.} = -7562.05 + 271.3\text{Temp} - 76.7\text{Precip} - 2.1\text{Temp}^2,$$

indicates that changes in visitation are related to variations in temperature and precipitation ( $R^2 = .45$ , all  $\beta$  coefficients significant beyond  $p < .01$ ). Streamflow was found to have no influence on visitation.<sup>13</sup> Because visitors have little knowledge of streamflow conditions before they leave home (unless they have called one of the rangers' office), decisions to visit ACW are based on available information (i.e. temperature and rainfall near home). A plot of predicted visitation v. average monthly temperature peaks at approximately 70° F and drops off at higher and lower temperatures. Seventy degree average temperatures occur during April, May, late September, and October. Thus, the model confirms the subjective observation that Spring and Fall, when climatic conditions are moderate, are the most popular times to visit ACW.

## ASSOCIATIONS BETWEEN CANYON DESTINATIONS AND USER TYPES

Hypothetically, if visitors are attempting to derive different kinds of experiences in a wilderness area and different parts of the wilderness offer unique kinds of opportunities, each part should play host to an identifiable visitor subpopulation. For example, visitors seeking solitude should gravitate to the side canyon and rimlands zones of Aravaipa Canyon Wilderness and, logically, the visitor subpopulations in those zones should be composed primarily of solitude seekers. We attempt in this section to identify whether distinctive subpopulations of visitors were associated with different parts of ACW.

Using logit models, we explored how 12 variables could influence visitors' choices of how far to travel in the main canyon, where to camp, and whether to visit side canyons and the rimlands. The variables used in the analysis were age, lifetime visits, length of stay, season of visit, whether children were travelling with the group or not, group size, cluster membership (see appendix 3), and scores on the five wilderness value scales (convenience, self-reliance, solitude, and pristine [see appendix 2]).

Our analysis demonstrated that most of these variables had little influence on the choices that people made while visiting ACW. Distance travelled in ACW was not significantly related to one's age, number of lifetime visits, number of children in the group, season of visit, and group size.<sup>14</sup> Distance travelled was related to length of stay, however. Logically, the longer people stay in ACW, the farther they are likely to venture into the wilderness area: staying one additional day (e.g. two instead of one or three instead of two) increased the odds of hiking as far as Horse Camp Canyon rather than only Javelina or Booger Canyons (depending on the entrance one uses) by 50%.<sup>15</sup>

**TABLE 6**  
**Frequency of use of side**  
**canyons for water sources.**  
**(Number of responses = 180)<sup>1</sup>**

	% OF RESPONSES
Hell's Half Acre	1.7%
Painted Cave	2.2
Javelina	12.2
Virgus	17.8
Horse Camp	12.8
Booger	8.3
Paisano	10.6
Hell Hole	28.9
Parson's	5.6

<sup>1</sup>Respondents could indicate that they obtained water from more than one water source.

Only one variable--group size--was associated with campsite selection: in one analysis, having a group size of one or two people as opposed to three or more people increased the odds of choosing a campsite other than Horse Camp, Virgus, or Hell Hole Canyons by 70%.<sup>16</sup> Therefore, small groups, who can fit into a variety of campsites in the main canyon, had a tendency to avoid these heavily used areas. Conversely, large groups sought out the areas around Horse Camp, Virgus, and Hell Hole Canyons because they offer relatively large campsites.

Finally, the choice of whether to visit side canyons and the rimlands was related to two primary factors: length of stay and lifetime visits. Overnight visitors and visitors with more experience in ACW were much more likely to travel out of the main canyon than day visitors and inexperienced visitors. According to one logit model, being an inexperienced day visitor increased the odds of visiting only the main canyon (rather than also taking in a side canyon or the rimlands) by 345%.<sup>17</sup> These results make intuitive sense since day visitors are not likely to have the time to leave the main canyon and first time visitors may focus their attention on the main canyon leaving other areas of ACW for future adventures.

## INFLUENCE OF PHYSICAL AND BIOLOGICAL ELEMENTS ON THE RECREATION EXPERIENCES OF VISITORS

As discussed in chapter 1, attributes of a setting determine the available recreation opportunities. Furthermore, visitors engaging in recreation behaviors in that setting should derive unique kinds of recreational experiences. Theoretically, then, if some visitors encounter different qualities or amounts of attributes in the setting than other visitors, they should derive different qualities of recreational experiences. To a limited extent, we have demonstrated this relationship to be true for ACW: solitude experiences, for example, are influenced by the number of groups encountered by visitors.

A corollary to our theoretical framework is that in distinct settings with unique attributional qualities, visitors should derive different qualities of recreational experiences. In other words, in different settings people should have different recreational experiences. The same visitor, for example, should have a stronger sense of solitude in a setting with few interparty contacts than in a setting with many such contacts.

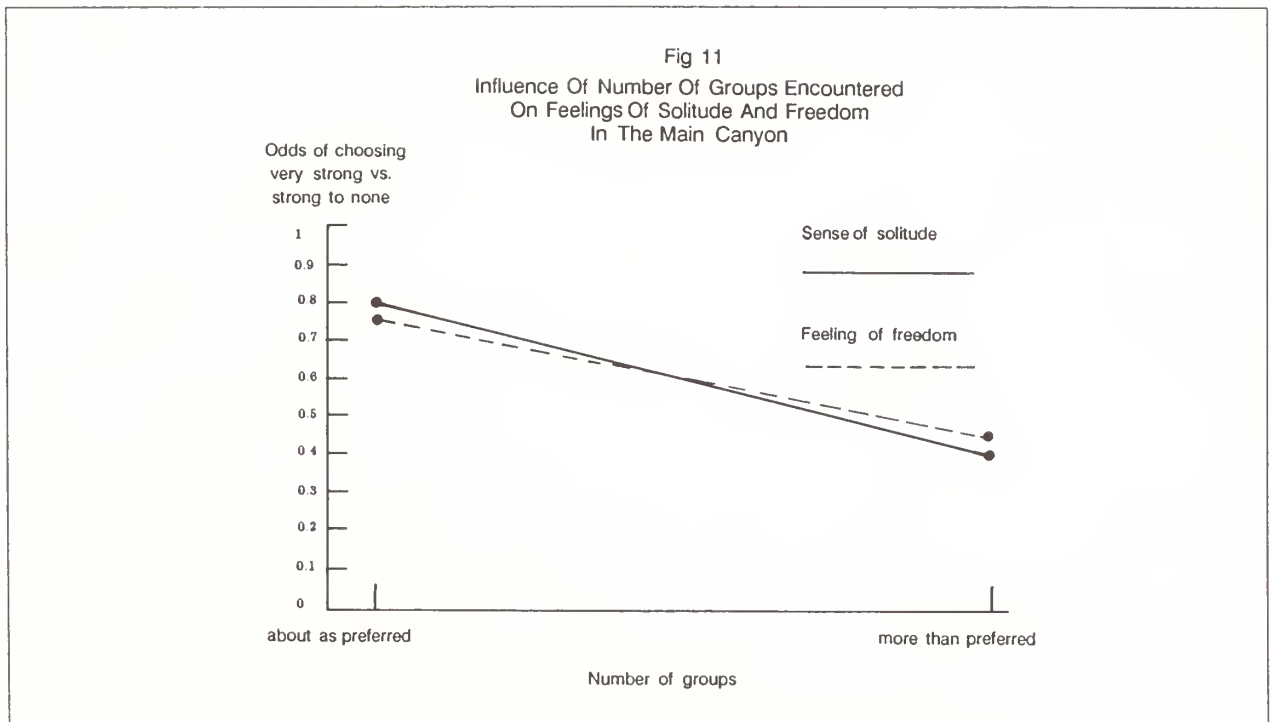
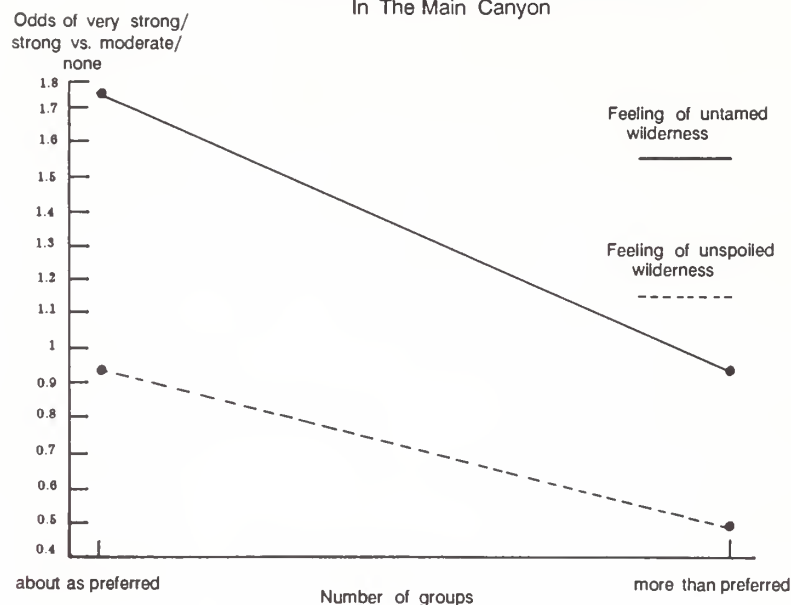




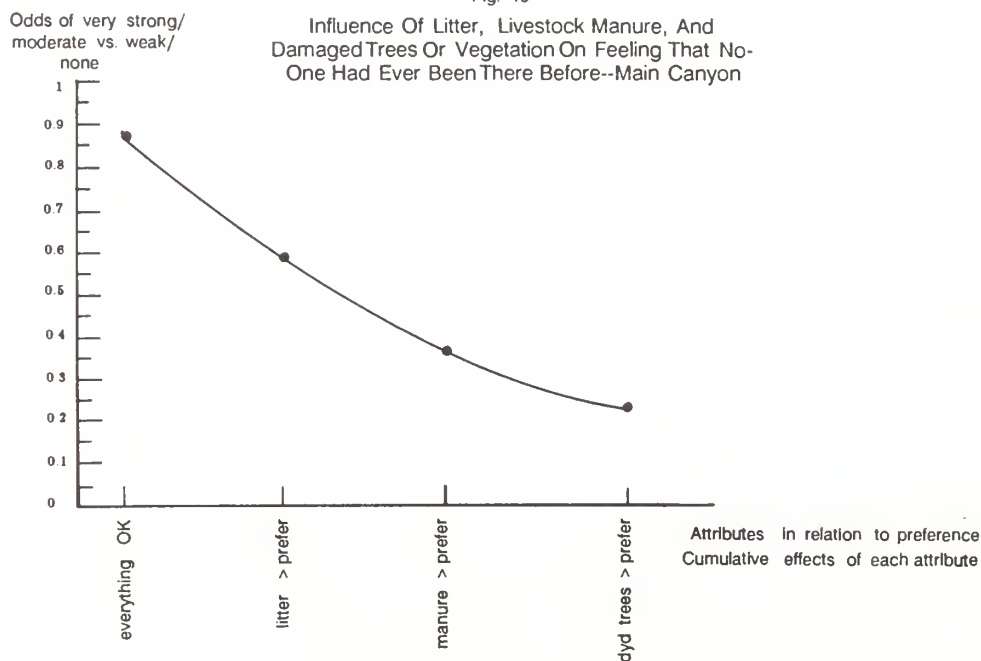
Fig. 12  
Influence Of Human Feces/Toilet Paper  
On Feelings Of Untamed And Unspoiled Wilderness  
In The Main Canyon



A final corollary to the framework is that people who desire certain kinds of experiences will only visit settings with appropriate qualities of attributes. Thus, if a person knows that a setting has attributes that will detract from attainment of desired experiences, he or she will not visit that setting.

In this section, we explore these corollaries as they apply to Aravaipa Canyon Wilderness. Expanding on the experience-contacts relationship, we look at the additional effects of physical and biological attributes of the setting. Then, we determine whether visitors derive unique recreational experiences in each of ACW's three zones. Finally, we evaluate whether any of ACW's attributes are currently dissuading any permit holders from visiting the wilderness area.

Fig. 13  
Influence Of Litter, Livestock Manure, And  
Damaged Trees Or Vegetation On Feeling That No-  
One Had Ever Been There Before--Main Canyon



## INFLUENCE OF PHYSICAL AND BIOLOGICAL ATTRIBUTES ON EXPERIENCES

Our examination of the effect of physical and biological setting attributes on the recreational experiences of visitors focused on the canyon corridor. Only a few attributes other than social contacts had significant influences. For example, of four variables--number of groups of people, evidence of campfires, number of large groups, and litter--only the number of groups of people encountered in the main canyon had a significant impact on feelings of solitude and freedom derived by visitors. If more groups were encountered than preferred, the odds of having very strong versus strong to no feelings of solitude were decreased by 29% (figure 11).<sup>18</sup> Similarly, the odds of having very strong feelings of freedom were diminished by 25% (figure 11).<sup>19</sup> These results confirm those obtained in chapter 3 where the link between feelings of solitude and freedom and numbers of groups encountered was established.

Feelings of untamed wilderness were affected significantly by the presence of human feces or toilet paper. Encountering human wastes decreased by 27% the odds of indicating a "very strong" to "strong" versus a "moderate" to "none" experience of untamed wilderness. (figure 12). Six additional attributes--evidence of campfires, damaged trees and vegetation, livestock manure, wildlife, low flying aircraft, and fire rings--did not have significant influences on feelings of untamed wilderness.<sup>20</sup> Similar results were obtained for feelings of unspoiled wilderness: encountering feces or toilet paper in the main canyon decreased the odds of having a very strong to strong experience by 37% (figure 12).<sup>21</sup>

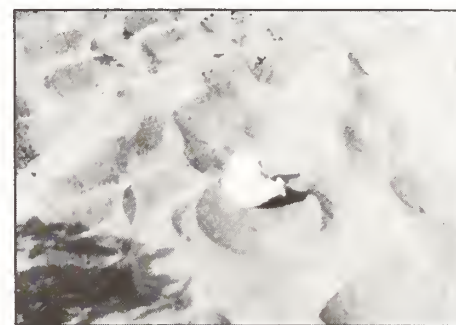
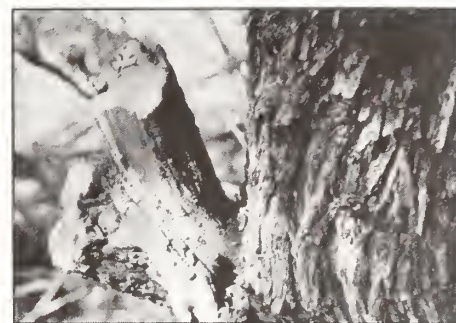
Finally, the feeling that no one else had been in the main canyon before was impacted by the presence of litter, livestock manure, and damaged trees and vegetation. If each of these conditions exceeded one's preferences, the odds of having a "weak" or "none" feeling that no one else had been there before were increased by 100% (figure 13).<sup>22</sup> Feces and fire rings had no significant influence on this recreational experience.

Feelings of discovery, danger, and security were not affected by any of the attributes discussed in this section.

## USE ZONE AND RATINGS OF RECREATIONAL EXPERIENCES

As indicated previously, each zone within ACW offers unique recreational opportunities to visitors. In the main canyon, which receives the bulk of the visitation, interparty contacts are likely and resource impacts and evidence of use by previous visitors is apparent. On the other hand, travel is reasonably easy because most hiking takes place on level, heavily trod paths or through Aravaipa creek. In contrast, in the side canyons, where brush and boulders often make progress difficult, and on the rugged and arid rimlands, visitation is lower and, correspondingly, interparty contacts and resource impacts are relatively rare.

The recreational experiences derived by visitors reflect the attributes of these environments. For example, in table 7 we compare visitors' ratings of the sense of solitude gained in the main canyon with the sense of solitude achieved in the side canyons. This table provides an interesting way of examining differences in the perceptions of the respondents. It shows whether and how *individuals* changed their ratings of solitude between the main canyon and side canyon zones of the wilderness area. If a respondent rated the sense of solitude identically in both zones, his or her response falls on the diagonal of the table. Fifty-one percent of the responses did so, thus indicating no difference between the two zones.<sup>23</sup> If a respondent rated either the main canyon or the side canyons higher in solitude, his or her response would fall in one of the triangles on each side of the diagonal. Forty-two percent of the responses fell into the "lower" triangle. This means that 42% of the respondents felt a stronger sense of solitude in the side canyons than in the main canyon.<sup>24</sup> Only 7% of the responses fell in the "upper" triangle. Thus, relatively few people found more solitude in the main canyon than in the side canyons. The difference between ratings of the main canyon versus ratings of the side canyons is statistically



Damaged trees and litter, among other things, affected recreational experiences.

**TABLE 7**  
**Sense of solitude in the main canyon**  
**vs. sense of solitude in the side canyons.**

		SIDE CANYONS				
		VERY STRONG	STRONG	MODERATE	WEAK TO NONE	ROW TOTALS & %
MAIN CANYON	VERY STRONG	101.62	15.25	1.72	0.95	119.54 (34%)
	STRONG	82.44	62.06	5.37	0.89	150.76 (43%)
	MODERATE	25.05	27.21	11.91	0.89	65.06 (19%)
	WEAK TO NONE	5.24	2.17	3.10	3.07	13.58 (4%)
	COLUMN TOTALS & %	214.35 (61%)	107.19 (31%)	22.10 (6%)	5.80 (2%)	349.44

Results of loglinear models:

	L <sup>2</sup>	df	p
SYMMETRY	96.79	6	.000
QUASISYMMETRY	2.95	3	.399
MARGINAL HOMOGENEITY	93.84	3	.000

**TABLE 8**  
**Sense of solitude in the side canyons**  
**vs. sense of solitude on the rimlands.**

		RIMLANDS		
SIDE CANYONS		VERY STRONG	STRONG TO NONE	ROW TOTALS & %
	VERY STRONG	20.05	17.30	37.35 (63%)
	STRONG TO NONE	5.24	16.76	22.00 (37%)
	COLUMN TOTALS & %	25.29 (43%)	34.06 (57%)	59.35

Loglinear symmetry model results:  
L<sup>2</sup>=6.808, df=1, p=.009.

**TABLE 9**  
**Feeling of freedom in the main canyon**  
**vs. feeling of freedom in the side canyons.**

		SIDE CANYON		
MAIN CANYON		VERY STRONG	STRONG	MODERATE TO NONE
	VERY STRONG	112.94	28.56	3.10
	STRONG	56.25	85.09	7.90
	MODERATE TO NONE	13.80	18.34	23.92
	COLUMN TOTALS & %	182.99 (52%)	131.99 (38%)	34.92 (10%)
		ROW TOTALS & %		144.60 (41%) 149.24 (43%) 56.06 (16%) 349.90

Results of log linear models:

	L <sup>2</sup>	df	p
SYMMETRY	20.80	3	.000
QUASISYMMETRY	.016	1	.939
MARGINAL HOMOGENEITY	20.79	3	<.001

**TABLE 10**  
**Sense of discovery in the main canyon**  
**vs. sense of discovery in the side canyons.**

		SIDE CANYON		
MAIN CANYON		VERY STRONG	STRONG	MODERATE TO NONE
	VERY STRONG	95.36	17.47	4.01
	STRONG	64.80	72.24	14.46
	MODERATE TO NONE	22.46	32.94	30.08
	COLUMN TOTALS & %	182.62 (52 %)	122.65 (35%)	48.55 (14%)
		ROW TOTALS & %		116.84 (33%) 151.50 (43%) 85.48 (24%) 353.82

Results of log linear models:

	L <sup>2</sup>	df	p
SYMMETRY	50.55	3	.000
QUASISYMMETRY	.23	1	.635
MARGINAL HOMOGENEITY	50.33	2	<.001



**TABLE 11**  
**Feeling of untamed wilderness in the main canyon**  
**vs. feeling of untamed wilderness in the side canyons.**

		SIDE CANYON		
MAIN CANYON		VERY STRONG	STRONG	MODERATE TO NONE
	VERY STRONG	64.93	12.98	4.66
	STRONG	48.15	64.71	17.85
	MODERATE TO NONE	19.24	55.25	65.16
	COLUMN TOTALS & %	132.32 (37%)	132.94 (38%)	87.67 (25%)
		ROW TOTALS & %		
		82.57 (23%)		
		130.71 (37%)		
		139.65 (40%)		
		352.93		

Results of log linear models:

	L <sup>2</sup>	df	p
SYMMETRY	51.16	3	.000
QUASISYMMETRY	1.89	10	.169
MARGINAL HOMOGENEITY	49.27	2	<.001

**TABLE 12**  
**Feeling of danger in the main canyon**  
**vs. feeling of danger in the side canyons.**

		SIDE CANYON		
MAIN CANYON		VERY STRONG TO MODERATE	WEAK	NONE
	VERY STRONG TO MODERATE	38.66	6.51	3.10
	WEAK	35.34	83.52	23.15
	NONE	14.30	36.43	110.98
	COLUMN TOTALS & %	88.30 (25%)	126.46 (36%)	137.23 (39%)
		ROW TOTALS & %		
		48.27 (14%)		
		142.01 (40%)		
		161.71 (46%)		
		351.99		

Results of log linear models:

	L <sup>2</sup>	df	p
SYMMETRY	32.64	3	.000
QUASISYMMETRY	.40	1	.528
MARGINAL HOMOGENEITY	32.24	2	<.001

**TABLE 13**  
**Feeling that no one else had been there before**  
**in the main canyon vs. feeling that no one else had**  
**been there before in the side canyon.**

		SIDE CANYON		
MAIN CANYON		VERY STRONG TO MODERATE	WEAK	NONE
	VERY STRONG TO MODERATE	116.62	4.76	2.95
	WEAK	66.96	54.42	7.32
	NONE	23.89	26.67	50.34
	COLUMN TOTALS & %	207.47 (59%)	85.85 (24%)	60.61 (17%)
		ROW TOTALS & %		353.93

Results of log linear models

	L <sup>2</sup>	df	p
SYMMETRY	94.79	3	.000
QUASISYMMETRY	3.34	1	.068
MARGINAL HOMOGENEITY	91.45	2	<.001

**TABLE 14**  
**Feeling of unspoiled wilderness in the main canyon**  
**vs. feeling of unspoiled wilderness in the side canyons.**

		SIDE CANYON	
MAIN CANYON		VERY STRONG TO STRONG	MODERATE TO NONE
	VERY STRONG TO STRONG	154.43	7.51
	MODERATE TO WEAK	77.27	110.22
	COLUMN TOTALS & %	231.70 (66%)	117.73 (34%)
		ROW TOTALS & %	
		349.43	

**TABLE 15**  
**Sense of security in the main canyon**  
**vs. sense of security in the side canyons.**  
**SIDE CANYONS**

MAIN CANYON		VERY STRONG	STRONG	MODERATE TO NONE	ROW TOTALS %
	VERY STRONG	64.40	27.76	5.11	97.27 (28%)
	STRONG	22.28	116.71	34.68	173.67 (50%)
	MODERATE TO NONE	6.72	15.34	54.27	76.33 (22%)
	COLUMN TOTALS & %	93.40 (27%)	159.81 (46%)	94.06 (27%)	347.27

Results of log linear models

	L <sup>2</sup>	df	p
SYMMETRY	8.498	3	0.037
QUASISYMMETRY	3.354	1	0.067
MARGINAL HOMOGENEITY	5.144	2	0.001

**TABLE 16**  
**Ratings of eight types of experiences in the side canyons**  
**compared to ratings of the same experiences on the rimlands.**

EXPERIENCE	% RATING EXPERIENCE SAME FOR BOTH ZONES	% RATING EXPERIENCE HIGHER FOR SIDE CANYONS	% RATING EXPERIENCE HIGHER FOR RIMLANDS	N
Sense of solitude <sup>1,4</sup>	62.0%	29.2%	8.8%	59.4
Feeling of freedom <sup>1,4</sup>	67.4	25.8	6.8	59.3
Sense of discovery <sup>1,4</sup>	71.9	21.0	7.1	59.3
Feeling of untamed wilderness <sup>2,4</sup>	64.3	32.4	3.3	59.4
Sense of security <sup>2,4</sup>	76.6	20.1	3.3	59.3
Feeling of danger <sup>3,5</sup>	76.4	11.8	11.9	59.4
Feeling that no one had been there before <sup>3,6</sup>	76.2	13.2	10.6	59.3
Feeling of unspoiled wilderness <sup>3,4</sup>	67.7	28.1	4.2	59.4

<sup>1</sup>Coded in 2 categories to avoid problems of sparse data: very strong; strong to none.

<sup>2</sup>Coded in 2 categories to avoid problems of sparse data: very strong to strong; moderate to none.

<sup>3</sup>Coded in 2 categories to avoid problems of sparse data: very strong to moderate; weak to none.

<sup>4</sup>p < .05 (loglinear symmetry model; see Bishop, Fienberg and Holland [1975]).

<sup>5</sup>p = .985 (loglinear symmetry model; see Bishop, Fienberg and Holland [1975]).

<sup>6</sup>p = .686 (loglinear symmetry model; see Bishop, Fienberg and Holland [1975]).

significant at  $p < .001$ .<sup>25</sup> We concluded that people who rated solitude different in the two zones were much more likely to give a higher rating for the side canyon zone than the main canyon zone.

Analogously, we found that the people who noted a difference between the side canyon and rimlands zones were more likely to rate solitude higher in the side canyons (table 8).<sup>26</sup> Here, 62% of the respondents found no difference in solitude between the two zones. Of the people who did report a difference, 77% reported higher feelings of solitude in the side canyon than on the rimlands.

Similar results were obtained for six additional types of recreational experiences. Freedom, discovery, untamed wilderness, danger, the feeling that no one had been there before, and unspoiled wilderness tended to be rated higher for side canyons than the main canyon (for people who felt a difference between the two zones) (tables 9-14). Note, however, that in each case, greater than 55% of the respondents rated the main canyon and the side canyons identically.<sup>27</sup> Accordingly, these results do not indicate that the two zones provide different experiences for *all* visitors. Apparently, though, a significant fraction of the population differentiates between the zones.

In only one case, security, did visitors rank the main canyon higher than the side canyons (table 15).<sup>28</sup> This result makes sense since many respondents rated the side canyons more dangerous than the main canyon. With higher levels of social contact than the side canyons, relatively frequent ranger patrols, and a moderate terrain, the main canyon does exude a feeling of security.

Contrary to our expectations, for many visitors, the rimlands provided *lesser* experiences of solitude, freedom, discovery, untamed wilderness, and unspoiled wilderness than the side canyons (table 16). We had expected that the vast, rugged and relatively unvisited rimlands would be ideally suited to these kinds of experiences. Possibly, most visitors who hiked to the rimlands did not travel far into the interior. Consequently, they remained in close touch with the main canyon and made little differentiation between it and the side canyons. As expected, though, a number of visitors felt less secure on the rimlands than in the side canyons. Hostile and exposed to the elements compared to the verdancy of most of the side canyons, the rimlands could easily arouse lowered feelings of security. Nevertheless, feelings of danger were not associated with the rimlands more than the side canyons: our results indicate that equal numbers of visitors found each zone more dangerous than the other (table 16). Another type of experience for which there was no differentiation is the feeling that no one had been there before. Evidently, indications of human use were as prevalent on the rimlands as in the side canyons.

## INFLUENCE OF PHYSICAL AND BIOLOGICAL ATTRIBUTES ON CHOICE OF WHETHER TO VISIT ACW

In question 23 of the survey (see appendix 1), we asked no-shows why they were unable to use their permits. The purpose of this question was to explore whether people were choosing not to visit ACW because conditions had deteriorated over time. Of particular interest was a recent rumor that ACW was not as attractive as it was in the past because of the 1983 flood.<sup>29</sup> We were also very interested in discovering whether potential visitors were receiving reports that ACW had become too crowded with people.

Neither concern surfaced in question 23. No respondents indicated that they had heard either that "ACW is too crowded" or "isn't as nice as it used to be". Consequently, we concluded that the rumored deterioration of site attributes had not dissuaded members of our sample from visiting ACW. Most no-shows cited personal schedule changes or other influences in their personal lives as reasons for their absence (table 17). Also cited were weather and streamflow conditions, automotive

**TABLE 17**  
**Reasons provided by respondents for being**  
**unable to use their permits.**  
**(Number of responses=86)**

### PERSONAL RESPONSIBILITIES

Change in personal schedule	36.0%
Other people in group could not go	20.2
Personal illness	7.9
Illness in family	4.5
Work schedule	1.1
Started too late in day	2.2

### WEATHER CONDITIONS

Too hot	1.1
Too cold	2.2
Raining	5.6
Creek was flooding	9.0

### OTHER

Car stalled in the creek	1.1
Scooter could not negotiate road	1.1
Car broke down on way to ACW	1.1
No room for camper	1.1
Hill at entrance too steep	
for horse trailer	1.1
Found blackhawks outside of ACW	1.1
Was not prepared to hike in water	1.1
Had pets	2.2



breakdowns, having pets along (which are prohibited), and other reasons. Again, however, we must consider that the sample was significantly motivated to visit ACW. People who had heard negative comments about ACW would not have requested or confirmed a permit to visit the wilderness area. Consequently, they would not have been part of our sampling frames.

## SUMMARY AND CONCLUSIONS

The physical and biological attributes of Aravaipa Canyon Wilderness undoubtedly have powerful effects on the recreational experiences of visitors. In their minds, visitors assemble impressions of these attributes to assign a sense of place to the entire wilderness and to unique settings within it. Most of the attributes that people encounter are perceived as enjoyable or pleasant things. The presence of these attributes helps visitors derive recreational experiences of a certain quality. Encounters with a few attributes, though, are not pleasant. Such encounters decrease the likelihood that visitors will attain high quality experiences. In the following conclusions, we detail how physical and biological attributes of the setting interact with attainment of recreational experiences at ACW:

1. Water, scenery, wildlife, and vegetation were strongly liked by most visitors and thus were the prime attractions of the wilderness area. Attributes that were disliked and hence had the potential for detracting from visitors' recreational experiences included litter, graffiti, human wastes, livestock manure, damaged vegetation, and campfire impacts. Four of these detractors were found to be abundant enough to have significant effects on three types of recreational experiences derived by visitors. One detractor, human wastes, was particularly influential and, consequently, deserves management attention.
2. The quality of experiences dependent on the condition of physical and biological attributes of the wilderness was rated lower than the quality of experiences based on social interaction. For example, feelings of untamed and unspoiled wilderness, in addition to the feeling that no one had been [in ACW] before, were rated substantially lower than feelings of solitude or freedom. We concluded that although social contacts may have been within acceptable limits, visitors were perceiving wear and tear from recreation on physical and biological attributes of the wilderness.
3. Significantly, 67% of the visitors reported that they saw less wildlife than they prefer. This result may simply characterize the inexperience of the visitor population or its unrealistically high expectations. To rectify the lack of experience of the visitors and to make their expectations more realistic, management could provide educational materials about how to view wildlife in ACW, including information on common wildlife species, when and where they might be seen, and how often a visitor can expect to see wildlife. The failure of visitors to see as much wildlife as they prefer could indicate that at least some species are being displaced out of areas used by visitors. Management may wish to consider the influence that recreational visitation is having on wildlife in the wilderness area.
4. Topographically and emotionally, ACW can be divided into three opportunity zones. These are the canyon corridor zone, the side canyons zone, and the rimlands zone. Besides being objectively different on many biological and physical attributes, visitors ranked the most important elements of each zone differently. Solitude and challenge were two important attributes of the side canyons and rimlands that received lower rank in the main canyon.
5. Reflecting the attributional qualities of these zones, many visitors attained different qualities of recreational experiences in each zone. For visitors who found a difference between the two zones, seven of eight kinds of recreational experiences were rated stronger in the side canyon zone than in the main canyon. Likewise, most experiences were rated stronger in the side canyons than in the rimlands. Only the sense of security in the canyon corridor and the feeling of danger on the rimlands were higher than in the side canyons. These findings suggest that management should set different limits of acceptable change for each opportunity zone.
6. Water quality was rated identically in the main canyon and side canyon zones. Regardless of

how they rated the water quality, though, visitors tended to purify water from Aravaipa Creek more often than water from the side canyons. Such behavior implies that side canyon waters are considered more drinkable than main canyon waters. Until this fact can be established, to protect public health, management may wish to advise visitors to purify side canyon waters.

7. Underscoring the critical importance of Aravaipa Creek as a focus of the wilderness area, visitors were capable of making fine distinctions in its flows. Small diminutions in the flow made visitors more likely to indicate that they saw less water than they prefer.
8. In addition to the three opportunity zones discussed above were two, ad hoc use zones based on how far people hiked into ACW and where they established their campsites. Because of Aravaipa's configuration, most visitors embarking from each trailhead did not encounter each other. This result demonstrates that social interactions were lower in the wilderness area than they would have been if the trailheads were closer together or if the length of stay limitation was increased (because visitors who stay longer penetrate farther into the corridor zone).
9. Of twelve demographic and other variables used to predict visitation of the three opportunity zones, only lifetime experience and length of stay had significant effects on the choice. For example, people who had visited ACW one or more times and were staying for more than one day were more likely to visit at least one side canyon or the rimlands than other visitors. Therefore, our hypothesis that visitors in each zone could be differentiated according to demographic and attitudinal variables was unsupported.
10. One choice behavior, campsite selection, was regulated by group size. Large groups chose sites that offer plenty of space, such as Horse Camp and Hell Hole Canyons. Small groups tended to select other campsites in the main canyon.
11. The choice of whether or not to visit ACW at all was primarily related to climatic variables. Our research demonstrated that average monthly visitation over a ten year period could reasonably well be predicted by temperature and precipitation records for southern Arizona. Additionally, no-shows most often cited schedule changes, in addition to weather conditions, as reasons for cancelling a trip. For the sample, then, our hypothesis that people were avoiding ACW because it had become too crowded or because resource conditions had deteriorated was unsupported by the data.

In the next chapter, we examine how visitors perceived management efforts to protect the physical and biological conditions at ACW.

## ENDNOTES

1. In all fairness, we should note that many respondents who expressed favorable attitudes toward seeing floods qualified their response by adding "if in a safe place at the time".
2. People who are unaccustomed to situations where campsites are not designated search out firerings and other obvious evidence of previous use to indicate where it is "ok" to camp.
3. Our use of solitude here as an attribute is inconsistent with the way we use the term in other parts of this report. Most often, we refer to solitude as an experience that is influenced by setting attributes.
4. The prominent rank of water as a rimland attribute makes little sense in light of the aridity of the zone (although some stock waters are present).
5. Unless noted, percentages reported in this section are based on answers to questions 24, 35, and 44 (see appendix 1).
6. A strong sense of discovery could also be attributed to the complexity of the wilderness setting

and to the absence of signs, which allowed visitors to discover the wilderness on their own

7. Some visitors who experienced flooding events felt very intimidated, however.
8. Many encounters with manure reported by the respondents may have actually occurred to the west of the wilderness boundary (on private land), in Turkey Creek Canyon, or on some parts of the rimlands.
9. Visitors' ratings of the water in the main canyon were compared with their ratings of side canyon waters. A loglinear, symmetry model fit to the data ( $L^2=8.49$ ,  $df=6$ ,  $p=.204$ ) demonstrated that each visitor did not rate both water sources identically. Actually, many visitors changed their ratings. This change is not reflected in the overall ratings (i.e. table 5) because statistically equal numbers of visitors raised and lowered their ratings. Therefore, of the visitors who changed their ratings, there was no tendency to rate one water source higher than the other.
10. The "purify/didn't purify" dichotomy was cross tabulated against the source of side canyon waters: Hell's Half Acre, Painted Cave, and Parson's Canyons (grouped to avoid problems of sparse data); Booger Canyon; Paisano Canyon; Javelina Canyon; Horse Camp Canyon; Virgus Canyon; and Hell Hole Canyon. A loglinear independence model fit the data ( $L^2=6.158$ ,  $df=6$ ,  $p=.406$ ), indicating no association between the variables. Confounding this analysis, however, is the structure of the water source question. Respondents were allowed to indicate more than one side canyon source. Thus, if multiple water sources were indicated by a respondent, the purify/didn't purify choice may not refer to the source used in the analysis.
11. This statement is based on the logit equation

$$\ln(<\text{preferred}/\text{about as preferred})=.45^*-.11*\text{FLOW1}+.06*\text{FLOW2},$$

which models the log-odds of indicating less than preferred as opposed to acceptable amounts of water vs. two flow variables, FLOW1 and FLOW2, set up as a spline function. FLOW1 equalled actual streamflows  $\leq 30$  cfs, and was pegged at 30 cfs for actual flows  $> 30$  cfs. FLOW2 was 0 for streamflows  $\leq 30$  cfs, equalled actual streamflows which were  $> 30$  cfs and  $\leq 50$  cfs, and was pegged at 50 cfs for flows  $> 50$  cfs. The model with the two flow variables achieved a significant improvement in fit over a model with no independent variables (change in  $L^2=15.10$ ;  $d.f.=5$ ;  $p<.01$ ). [ $*p<.05$ ]

12. The data for this analysis were obtained from National Oceanic and Atmospheric Administration (1975-1984) and U.S. Geological Service (1976-1987).
13. The variable was dropped from the equation with no significant change in  $R^2$ .
14. Three of these variables--age, number of lifetime visits, and number of children--were continuous. For these variables, the following hypotheses were tested with one-way analysis of variance procedures. ( $H_1$ ) the mean ages of visitors in each of 10 destination zones in ACW were equal (i.e.  $u_1=u^2=\dots=u^{10}$ ). ( $H_2$ ) the mean number of lifetime visits of each respondent in each destination zone were equal. And, ( $H_3$ ), the mean number of children travelling with groups in each zone are equal. The destination zones were the west boundary and Hell's Half Acre Canyon (combined), Painted Cave Canyon, Javelina Canyon, Virgus Canyon, Horse Camp Canyon, Booger Canyon, Paisano Canyon, Hell Hole Canyon, Parson's Canyon, and east entrance. The zones were used as rough estimates of the distance travelled by all visitors to ACW. None of the three hypotheses was contradicted by the evidence:  $H_1$ ,  $F=1.025$ ,  $df=9,486$ , and  $p=.418$ ;  $H_2$ ,  $F=1.242$ ,  $df=9,486$ ,  $p=.267$ ; and  $H_3$ ,  $F=1.120$ ,  $df=9,486$ ,  $p=.347$ .

The remaining variables--season of visit and group size--were analyzed as categorical variables with loglinear independence models. Independence fit for both crosstabulations:  $L^2=16.402$ ,  $df=21$ ,  $p=.747$  for distance vs. season (spring, summer, fall, and winter) and  $L^2=17.209$ ,  $df=14$ ,



$p=.245$  for distance vs. group size (1-2 people, 3-4 people, and 6 or more people).

15. A loglinear, uniform association model fit the crosstabulation distance vs. length of stay ( $L^2=17.145$ ,  $df=13$ ,  $p=.193$ ). This was a considerable improvement in fit over the independence model ( $L^2=60.014$ ,  $df=14$ ,  $p=.000$ ). Length of stay was coded 1=one day, 2=two days, and 3=three days.

16. This statistic was derived from the following logit equation ( $L^2=5.963$ ,  $df=5$ ,  $p=.310$ ):

$$\ln(F_{11111}/F_{21111}) = -.548 - .068\text{CHILD} + .028\text{VISLIF} - .321\text{LENGTH} + .528\text{GROUP},$$

where  $\ln(F_{11111}/F_{21111})$  is the odds of choosing a first night's campsite other than Hell Hole, Horse Camp, or Virgus Canyons; CHILD=1 for no children and 2 for children with group; VISLIF=1 for first visit and 2 for repeat visitors; LENGTH=length of stay, 1=1 day, 2=2-3 days; and GROUP=1 for group size of 1-2 and 2=group size of 3 or more. All associations between the independent variables were controlled in this analysis. [ $*p<.05$ ]

17. The logit model supporting this statement was ( $N=360$ ;  $L^2=15.89$ ;  $df=11$ ;  $p=.145$ ):

$$\ln(F_{11111}/F_{21111}) = -.429 - .126\text{AGE} + .727^b\text{VISLIF} + .767^b\text{LENGTH} - .148\text{SEASON},$$

where  $\ln(F_{11111}/F_{21111})$  is the odds of visiting only the main canyon over visiting also side canyons and the rim; AGE=the respondent's age, 1=<37 years, 2=>36 years; VISLIF=lifetime visits, 1=0 to 1, 2=2 or more; LENGTH=stay length, 1=1day, 2=2days; and SEASON=season of visit, 1=spring or fall, 2=summer or winter. All association among the independent variables was controlled in this analysis. [ $*p<.01$ ;  $^b p<.001$ ]

18. This result was based on the logit equation ( $N=468$ ,  $L^2=9.641$ ,  $df=11$ ,  $p=.563$ )

$\ln(f_{11111}/f_{21111}) = .950^a + .340^b\#\text{GROUPS} + .042\text{FIRES} + .250\text{LGROUPTS} + .170\text{LITTER}$ ,  
where  $\ln(f_{11111}/f_{21111})$ =the log odds of a having a very strong over a strong to no feeling of solitude; #GROUPS=the number of groups encountered in the main canyon; FIRES=the evidence of campfires; LGROUPTS=the number of large groups; and LITTER=the amount of litter. #GROUPS, FIRES, LGROUPTS, and LITTER were coded 1=about as preferred and 2=more than preferred. All association among the independent variables was controlled in this analysis. [ $*p<.001$ ;  $^b p<.05$ ]

19. This result was based on the logit equation ( $N=467$ ,  $L^2=13.427$ ,  $df=11$ ,  $p=.266$ ):

$$\ln(f_{11111}/f_{21111}) = -.750^a + .282^b\#\text{GROUPS} + .043\text{FIRES} + .165\text{LGROUPTS} + .098\text{LITTER},$$

where  $\ln(f_{11111}/f_{21111})$ =the log odds of a having a very strong over a strong to no feeling of freedom; #GROUPS=the number of groups encountered in the main canyon; FIRES=the evidence of campfires; LGROUPTS=the number of large groups; and LITTER=the amount of litter. #GROUPS, FIRES, LGROUPTS, and LITTER were coded 1=about as preferred and 2=more than preferred. All association among the independent variables was controlled in this analysis. [ $*p<.001$ ;  $^b p<.05$ ]

20. This result was based on the following logit equation ( $N=459$ ;  $L^2=6.083$ ;  $df=11$ ;  $p=.868$ ):

$$\ln(f_{11111}/f_{21111}) = .266^a + .310^a\#\text{FECES} + .155\text{FIRES} - .088\text{TREES} + .082\text{MANURE},$$

where  $\ln(f_{11111}/f_{21111})$ =the log odds of a having a very strong to strong versus a moderate to no feeling of untamed wilderness; FECES=feces or toilet paper on the ground; FIRES=the evidence of campfires; TREES=damaged trees or vegetation; and MANURE=manure from livestock. FECES, FIRES, TREES, AND MANURE were coded 1=about as preferred and



21. This result was based on the following logit equation ( $N=458$ ;  $L^2=5.952$ ;  $df=11$ ;  $p=.877$ ):

$$\ln(f_{11111}/f_{21111}) = -.518 + .425 \text{FECES} + .124 \text{FIRES} + .117 \text{TREES} - .082 \text{LITTER},$$

where  $\ln(f_{11111}/f_{21111})$ =the log odds of a having a very strong to strong versus a moderate to no feeling of untamed wilderness; FECES=feces or toilet paper on the ground; FIRES=the evidence of campfires; TREES=damaged trees or vegetation; and LITTER=amount of litter. FECES, FIRES, TREES, AND LITTER were coded 1=about as preferred and 2=more than preferred. All association among the independent variables was controlled in this analysis. [ $p<.10$ ]

22. This result was based on the following logit equation ( $N=455$ ;  $L^2=16.515$ ;  $df=11$ ;  $p=.123$ ):

$$\ln(f_{11111}/f_{21111}) = -.981 + .135 \text{FECES} + .251 \text{TREES} + .225 \text{LITTER} + .236 \text{MANURE}^b$$

where  $\ln(f_{11111}/f_{21111})$ =the log odds of a having a very strong to strong versus a moderate to no feeling of untamed wilderness; FECES=feces or toilet paper on the ground; TREES=damaged trees or vegetation; LITTER=amount of litter; and MANURE=livestock manure. FECES, TREES, LITTER, and MANURE were coded 1=about as preferred and 2=more than preferred. All association among the independent variables was controlled in this analysis. [ $p<.10$ ;  $^b p<.05$ ;  $^c p<.001$ ]

23. This percentage was derived by counting the respondents who fell on the diagonal of the table, dividing by the total  $N$ , and multiplying by 100%
24. This result was obtained by counting the number of respondents falling into the lower triangle of the table (not including the diagonal), dividing by the total  $N$ , and multiplying by 100%.
25. We tested the hypothesis ( $H_0$ ) that the number of people rating solitude higher in the main canyon was equal to the number of people rating solitude higher in the side canyons against the alternate hypothesis ( $H_1$ ) that the numbers were unequal. Loglinear symmetry and quasi-symmetry models were applied to the data. By testing for marginal homogeneity, we thereby tested  $H_0$ . The marginal homogeneity test was conducted by calculating the difference in  $L^2$  between the symmetry and quasi-symmetry models and comparing the resulting statistic to a table of  $\chi^2$  values. The test of marginal homogeneity examined the assumption that the marginal totals for each corresponding row and column are equal (for example, that the row total for very strong solitude in the main canyon = the column total for very strong solitude in the side canyon, and so on). Because the marginal homogeneity model failed to fit the observed data ( $L^2=93.837$ ,  $df=3$ ,  $p<.001$ ),  $H_1$  was accepted in lieu of the evidence against  $H_0$ . See Bishop, Fienberg, and Holland (1975) for a description of this approach to square tables.
26. In this case, a symmetry model was applied to the table, but the process is analogous to the one for marginal homogeneity models discussed in the previous footnote (symmetry and marginal homogeneity models are equivalent for 2X2 tables--see Bishop, Fienberg, and Holland [1975]). The symmetry model failed to fit table 8 ( $L^2=6.808$ ,  $df=1$ ,  $p=.009$ ).
27. Given the way categories were collapsed for analysis, that is.
28. Note that the marginal homogeneity model in table 15 nearly fit the data ( $p=.08$ ). We are using a rule of thumb proposed by Knoke and Burke (1980) that an adequate fit for a loglinear model is represented by a range of  $.10 \leq p \leq .35$ .
29. In October of 1983, a catastrophic flood swept through Aravaipa Canyon taking with it numerous mature shade trees and leaving behind piles of debris.

## 6. MANAGERIAL SETTING

To ensure that visitors can derive experiences of a certain quality from a wilderness area, it must be managed. Information must be gathered (such as this report is doing) about who uses the area, how they use it, and how it affects them. From the information and based on management objectives, standards must be developed regarding the kinds of conditions to be maintained in the wilderness. And, if current conditions do not fall within the boundaries established by the standards, corrective actions must be taken to bring conditions within reasonable bounds.

Management actions can cover a spectrum of techniques, from leaving the area alone, if conditions are satisfactory, to development of extensive facilities for visitor convenience. Whatever the choice, each action influences visitors. Management activities become part of the recreational setting and thus influence the kinds of opportunities that are available. Since experiences derive from recreational opportunities (chapter 1), management actions can have a direct influence on the quality of experiences attained by visitors.

Wilderness management techniques are often aligned on a continuum from “heavy-handed” to “light-handed” (Brown, McCool, and Manfredo 1987) with respect to how much they intrude on a visitor’s recreational experiences or regiment use of a recreation site. Lime (1976), for example, describes a hierarchy of three decreasingly intrusive methods of wilderness management: site management, direct regulation of use, and indirect regulation of use (table 1). We use Lime’s hierarchy in this chapter as a framework for discussing respondents’ attitudes toward management techniques employed at ACW. We also assess how much respondents favored various techniques and, to a limited extent, how respondents’ recreation experiences and choices were influenced by management activities.

### SITE MANAGEMENT

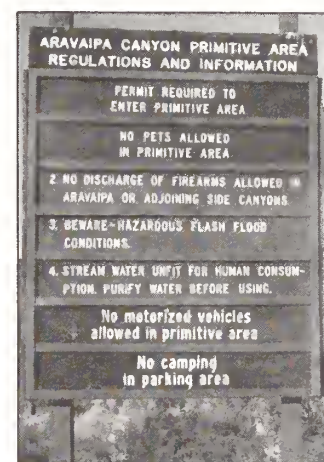
Site management includes direct manipulations of the wilderness setting to maintain its ecological integrity (e.g. paving trails to reduce erosion), channel visitor use (e.g. erecting fences to protect sensitive areas), or provide for the convenience of visitors (e.g. develop interpretive facilities). Very little site management is practiced at ACW. The most intrusive developments in the wilderness are a few signs at each end, a cattle fence at the west boundary, and a few signs designating side canyons. We surveyed respondents’ attitudes toward these developments and two additional types of development currently not present in ACW: maintained trails and toilet facilities at popular campsites.<sup>1</sup>

### ATTITUDES TOWARD INTERPRETIVE AND DIRECTIONAL SIGNS

The idea of having interpretive and directional signs in ACW was liked by 52.6% and disliked by 29.3% of our sample (table 2). Approval of signs was related to familiarity with the wilderness area and related navigational problems. Attitudes toward signs were negatively associated with experience: the more times a respondent had visited ACW during his or her lifetime, the less likely he or she was to favor signs (table 3).<sup>2</sup> Many respondents wrote that they had difficulty judging distances and identifying landmarks while hiking through the wilderness area. These individuals were likely to comment that they favored signs or trail markers.

Attitudes toward signs as an educational tool were mixed. A few respondents asked for signs that interpret ecological and historical features of the wilderness. A similar number wrote comments deploring installation of such signs. They objected to the intrusion of signs on wilderness aesthetics.

Visitor support for directional and informational signs exists in other wilderness areas. In three wilderness areas in Wyoming, Anderson and Manfredo (1985) reported that 68% of their respondents endorsed installation of “well-maintained directional signs.” Lucas (1985) found that a narrow



**TABLE 1**  
**Types of recreation management methods.**

METHOD TYPE	GOAL	MANAGEMENT TOOL
<b>SITE MANAGEMENT</b>  (Emphasis on site design, landscaping and engineering)	Harden site	Install durable surfaces (native, nonnative, synthetic) Irrigate Fertilize Revegetate Convert to more hardy species Thin ground cover and overstory
	Channel use	Erect barriers (rocks, logs, posts, fences, guardrails) Construct paths, roads, trails, walkways, bridges, etc. Landscape (vegetation patterns)
	Develop facilities	Provide access to underused and/or unused areas Provide sanitation facilities Provide overnight accommodations Provide concessionaire facilities (camping, picnicking, boating, docks, and other platforms, playground equipment, etc.) Provide interpretive facilities
<b>DIRECT REGULATION OF USE</b>  (Emphasis on regulation of behavior; individual choice restricted; high degree of control)	Increase policy enforcement	Impose fines Increase surveillance of area
	Zone use	Zone incompatible uses spatially (hiker-only zones, prohibit motor use, etc.) Zone uses over time Limit camping in some campsites to 1 night, or some other limit
	Restrict use intensity	Rotate use (open or close roads, access points, trails, campsites, etc.) Require reservations Assign campsites and/or travel routes to each camper group in backcountry Limit usage via access point Limit size of groups, number of horses, vehicles, etc. Limit camping to designated campsites only Limit length of stay in area (max./min.)
<b>INDIRECT REGULATION OF USE</b>  (Emphasis on influencing or modifying behavior; individual retains freedom to choose; control less more variation in use possible)	Restrict activities	Restrict building campfires Restrict fishing or hunting
	Alter physical facilities	Improve (or not) access roads, trails Improve (or not) campsites and other concentrated-use areas  Improve (or not) fish or wildlife populations (stock, allow to die out, etc.)
	Inform users	Advertise specific attributes of the area Identify the range of recreation opportunities in complete, surrounding area Educate users to basic concepts of ecology Advertise underused areas and general patterns of use
	Set eligibility requirements	Charge constant entrance fee Charge differential fees by trail, zone, season, etc. Require proof of ecological knowledge and recreational activity skills

From Lime (1976) as presented in Brown, McCool, and Manfredi (1987).



**TABLE 2**  
**Respondents' attitudes toward site management at Aravaipa Canyon Wilderness**

	STRONGLY DISLIKE %	DISLIKE %	NEUTRAL %	STRONGLY LIKE %	LIKE %	N
MAINTAINED TRAILS	13.5	19.2	23.4	29.5	14.5	657
INTERPRETIVE OR DIRECTIONAL SIGNS AT POINTS OF INTEREST	14.7	14.6	18.2	32.7	19.8	657
TOILET FACILITIES AT POPULAR CAMPSITES	26.1	17.8	22.1	19.8	14.2	654
CATTLE FENCES AT WILDERNESS BOUNDARIES	3.5	5.1	28.9	26.9	35.7	655
CATTLE IN ARAVAIPA CANYON	53.7	21.3	20.0	3.8	1.2	656

majority supported information signs in the Bob Marshall Wilderness Complex. The absence of directional signs in the Linville Gorge and Joyce Kilmer/Slickrock Wilderness Areas was a primary concern to visitors (Roggenbuck, Watson, and Stankey 1982). Negative associations between experience and preference for signs were also reported by Tarbet, Moeller, and McLoughlin (1977) and Lucas (1985).

Stankey and Schreyer (1987:270) summarize current attitudes toward signs by noting that "adequate signing, including basic directional information, appears to be considered appropriate to most visitors." They proceed to suggest that even limited interpretive signs may be acceptable to visitors (although they are contrary to Forest Service and BLM<sup>3</sup> policy).

**ATTITUDES TOWARD TOILET FACILITIES** Although a large percentage (44%) of respondents would dislike having toilet facilities in ACW, a large minority (34%) favored their installation (table 2). Presumably, some of these respondents favored toilets because of convenience and comfort. Others favored them because of implied health benefits and aesthetics. Many respondents saw and reported evidence of improper waste disposal: toilet paper was left lying on the ground and feces were not adequately buried in "cat holes." They also raised concerns about the relationship between waste disposal and water quality impairment.<sup>4</sup> Thus, distaste for the aesthetics of incorrect waste disposal was combined with apprehension about presumed health effects. These

**TABLE 3**  
**Attitudes toward interpretive and directional signs by experience of the respondent. Observed and (expected) values for a uniform association model ( $L^2 = 9.61$ ; d.f.=10;  $p=.475$ ).**

ATTITUDE TOWARD SIGNS	NUMBER OF LIFETIME VISITS											
	0	1	2	3	4	5	6	7	8	9	10	11+
DISLIKE	4.24 (9.08)	69.28 (70.20)	30.19 (24.40)	15.79 (14.59)	11.90 (11.25)	7.87 (9.05)	12.92 (11.25)	6.12 (5.22)	4.37 (6.91)	.67 (.89)	6.18 (6.65)	16.35 (16.39)
LIKE	28.99 (24.15)	163.38 (162.46)	43.41 (49.18)	24.37 (25.57)	16.50 (17.15)	13.18 (12.00)	11.31 (12.98)	4.33 (5.24)	8.58 (6.04)	.89 (.67)	4.87 (4.40)	9.46 (9.43)



attitudes prompted many respondents to favor toilets even though they disliked the intrusion into the wilderness area. According to one visitor:

*Toilets at popular use spots are perhaps a necessary evil considering the amount of use and ignorance [of how to properly dispose of wastes], however, they should be placed in discrete locales out of sight.*

At the Boundary Waters Canoe Area (BWCA), support for toilet facilities was also related to health and other environmental concerns (Stankey 1973). As in ACW, campsites at the BWCA are closely associated with water systems. Visitors there perceived a need for toilets to prevent human wastes from entering lakes and streams. Where links between campsites and water bodies are less direct (such as in many western wilderness areas, health concerns do not predominate and visitors seem to disfavor toilet facilities (based on information provided in Stankey and Schreyer [1987])).

**ATTITUDES TOWARD CATTLE FENCES** Cattle fences at wilderness boundaries were endorsed by 63% of the sample (table 2). Few respondents (9%) objected to this site development. Favorable attitudes toward the fences undoubtedly stemmed from unfavorable attitudes toward cattle in the wilderness area: 75% of the sample would dislike finding cattle in ACW. Comments about cattle indicate that respondents dislike them because they trample vegetation and leave undesirable wastes on land and in water sources. Cattle wastes finding their way into the Aravaipa Creek was of particular concern to a number of respondents.

Many visitors' attitudes about cattle appear to have been influenced by recent publications such as *Sacred Cows at Public Trough* (Ferguson and Ferguson 1983) and publicity efforts by environmental groups to eliminate cattle from public lands. For example, one respondent commented: "keep all cows far away from any wilderness. Cattlemen are overgrazing the entire west, ruining land." Research on public attitudes toward cattle in wilderness is rare, but hunter-rancher antagonisms in New Mexico have been documented (Knight, Foster, and Lansford 1987) as have visual preferences for less intensively grazed environments (Sanderson, Meganck, and Gibbs 1986).

## DIRECT REGULATION OF USE

Though less physically intrusive than site management, direct regulation, by imposing restrictions on behaviors of visitors, still regiments recreational use of a site. Because direct regulation restricts individual freedoms, it has at times been controversial. Behan (1974), for example, strongly opposed proposals to require mandatory wilderness permits. In other instances, where wilderness users found new regulations to be unduly restrictive, they challenged the restrictions in a court of law (Utter 1979; Stankey and Schreyer 1987). Public perception of direct regulatory methods, then, is important to managers.

Techniques employed under direct regulation include policy enforcement (e.g. imposing rules and regulations and citing rulebreakers), separating incompatible uses through zoning, restricting the activities of visitors (e.g. restricting fishing and hunting), and restricting use intensity (e.g. imposing group size, length of stay and total visitation limits). A number of direct management techniques are employed at ACW. Permits are required for entry and reservations are accepted up to six months in advance. A visitation limit of 50 persons at any one time is imposed.

**TABLE 4**  
Respondents' attitudes toward a ranger on patrol  
at Aravaipa Canyon Wilderness.

	STRONGLY DISLIKE %	DISLIKE %	NEUTRAL %	STRONGLY LIKE %	LIKE %	N
A RANGER ON PATROL IN THE MAIN CANYON	2.7	3.8	35.4	39.7	18.3	661
A RANGER ON PATROL IN A SIDE CANYON	4.2	8.8	49.1	28.8	9.1	658
A RANGER ON PATROL ON THE RIMLANDS	3.9	5.0	53.8	28.6	8.7	661

Visitors must pay a fee of \$1.50 per person per day (unless they are senior citizens, in which case they pay half that amount). Visits are limited to three days and two nights. Two rangers patrol the main canyon at least three days per week. The discharge of firearms is prohibited in the canyon bottoms. Horseback travel is restricted to day use only. And, pets are not allowed.

## PRESENCE OF RANGERS

Of these techniques, rangers on patrol have the greatest potential to influence visitors' behavior and recreational experiences: they can speak to visitors personally, respond to questions, and enforce regulations.<sup>5</sup> They also have great potential to intrude on a visitor's recreational experience.

We investigated visitors' perceptions of rangers from a variety of perspectives. First, we asked how much respondents would like to encounter a ranger on patrol in the main canyon, in a side canyon, and on the canyon rim (table 4). In all three settings, most respondents would accept such an encounter. Encounters with a ranger were, however, more preferable in the main canyon than in other settings (table 4). Less preference for encountering a ranger in a side canyon or on the rim may be associated with the idea that such settings are sanctuaries of privacy and solitude (see chapter 5). Therefore, a ranger's presence in a side canyon or on the rimlands would be more intrusive than in the main canyon.

Second, we asked how many contacts with a ranger would be acceptable to respondents during a one day visit (table 5). We found that most visitors (95.8%) would accept one to two contacts. This is essentially the contact norm reported for medium-sized groups (chapter 4). In comparison, respondents demonstrated slightly more acceptance for contacts with a small group. For example, 49.7% of our sample population would accept three to five contacts with a small group, whereas only 16.7% would accept a corresponding number of contacts with a ranger.

Third, we asked how important knowing that rangers are on patrol would be to respondents (table 6). This question was one of five questions designed to probe how secure visitors feel during a trip to ACW. Forty-two% of the respondents reported that such knowledge would be very important to them. Another 36% reported that it would be moderately important. These results indicate that a ranger's presence in ACW is a source of comfort and security to visitors. We tested this hypothesis by examining the influence that contacts with rangers in the main canyon have on visitors' feelings of security and danger. Visitors who reported having fewer contacts with rangers than they prefer were more likely to report reduced feelings of security and increased feelings of danger (tables 7 and 8).

Another way of looking at the same issue is through question five (see appendix 1). In this question we asked whether respondents agreed, were neutral to, or disagreed with the following statement: "rangers should patrol more often in ACW". Most respondents (85.6%) were neutral to or disagreed with the statement (table 9). We compared the mean self-reliance scores<sup>6</sup> of the "agree" group with the "neutral-disagree" group and found *higher* scores for the "agrees" than the other group (mean<sub>agree</sub> = 1.659; mean<sub>neu-dis</sub> = 1.059;  $t=7.10$ ;  $d.f.=572$ ;  $p=.000$ ). Since higher scores on this scale indicate a *lower* degree of self-reliance, we concluded that respondents who would like rangers to patrol more often in ACW were less self-reliant than other respondents.

Contacts with rangers were desired for three reasons. First and possibly foremost, rangers provided information. They helped visitors locate where they were in the wilderness (not an insignificant feat for a first-time visitor), they gave suggestions about where to camp, they told visitors where bighorn sheep could be seen, they interpreted the environment, and they offered safety tips. Most positive comments from respondents about rangers lauded their role as information

**TABLE 5**  
Social contact preferences for  
encountering a ranger on patrol  
during a one day visit. N=663

0 Times	4.2%
1-2 Times	73.6
3-5 Times	16.7
6-10 Times	2.7
More than 10 Times	2.8

**TABLE 6**  
Importance of knowing that a  
ranger is on patrol in ACW.  
N=663

Very important	42.1%
Moderately important	36.1
Slightly important	14.9
Not important	6.8



**TABLE 7**  
**Crosstabulation of feeling of security v. rangers**  
**on patrol: expected values under a loglinear**  
**model.<sup>1</sup> ( $L^2=.24$ ;  $df=1$ ;  $p=.62$ ;  $N=457$ )**

		RANGERS ON PATROL <sup>3</sup>	
		<PREFERRED	OK
FEELING OF SECURITY <sup>2</sup>	VERY STRONG	11.79	94.65
	STRONG	36.17	193.39
	MODERATE TO NONE	28.09	91.83

<sup>1</sup>Feeling of security treated as an ordinal variable. See Clogg and Shockey (1988) for an explanation of the model.

<sup>2</sup>This item is from question 25 (see appendix 1). Some categories were collapsed to avoid problems of sparse data.

<sup>3</sup>This item is from question 30 (see appendix 1). Some categories were collapsed to avoid problems of sparse data. Both "more than I prefer" categories were eliminated because they could not logically be collapsed into the "about what I prefer" category.

providers. Conversely, most negative comments about rangers concerned their absence when information was desired.

Second, rangers, by their presence in the canyon, made the setting feel more secure for some visitors. As noted above, respondents who scored lower on our self-reliance scale desired more ranger patrols. Also, visitors who encountered a distressful event (such as a flood) tended to question why a ranger was not there to help them.

Finally, rangers are part of the wilderness setting. Because of expectations cultivated from books, movies, television programs, and magazines, many visitors associate rangers with wilderness and expect, or even anticipate, encounters with rangers. The personality of the ranger and how he or she interacts with visitors, then, influences how people feel about a wilderness area and the degree of regimentation imposed on it.

Positive attitudes toward wilderness rangers are common. In the Bob Marshall Wilderness Complex, rangers are highly regarded even though they have little contact with visitors. (Lucas 1985). Stankey (1973), who found strong support for rangers in four U.S. wilderness areas, attributed the favorable attitudes to the rangers' visitor contact and cleanup activities.

**PERMIT AND RESERVATION SYSTEM** Attitudes toward the reservation and permit system are presented in table 9. Strong support for the reservation system and the idea of limiting visitation was voiced by our respondents: 91.3% agreed that the reservation system is easy to understand; 90.8% agreed that the system is fair; and 92.5% disagreed with a proposal to not have the BLM limit visitation (see question 7, appendix 1).

**TABLE 8**  
**Crosstabulation of feeling of danger v. rangers**  
**on patrol: expected values under a**  
**loglinear model<sup>1</sup> ( $L^2=.52$ ;  $d.f.=1$ ;  $p=.47$ ;  $N=458$ ).**

		RANGERS ON PATROL <sup>3</sup>	
		<PREFERRED	OK
FEELING OF DANGER <sup>2</sup>	VERY STRONG	15.65	94.65
	STRONG	34.04	193.39
	MODERATE TO NONE	27.13	91.83

<sup>1</sup>Feeling of danger treated as an ordinal variable. See Clogg and Shockey (1988) for a description of this model.

<sup>2</sup>This item is from question 25 (see appendix 1). Some categories were collapsed to avoid problems of sparse data.

<sup>3</sup>This item is from question 30 (see appendix 1). Some categories were collapsed to avoid problems of sparse data. Both "more than I prefer" categories were eliminated because they could not logically be collapsed into the "about what I prefer" category.

These results are not surprising, given that the permit and reservation system has been in place at ACW for over a decade. Familiarity with the system breeds acceptance (Stankey and Schreyer 1987). Furthermore, persons objecting to the system were self-selected or displaced out of our sampling frame. Their opinions simply were not surveyed.

One variable in the permit and reservation system--the advance reservation period--concerned the 25% of the respondent population who felt that the current six month period is too long (table 9). These people suggested a mean reservation period of 2.5 months (table 10). This figure corresponds fairly well with the mean reservation period of 2.2 months (95% c.i.  $\pm .2$  months) actually used by visitors. Only 9% of the respondents felt that 6 months was not enough advance time to reserve a permit (table 9). They suggested a preferred period of about 12 months (table 10).

Stankey and Baden (1977) propose that long



**TABLE 9**  
**Attitudes toward direct regulation of use techniques**  
**employed at Aravaipa Canyon Wilderness.**

	AGREE	NEUTRAL	DISAGREE	N
The reservation system is easy to understand	91.3%	7.0%	1.7%	663
The reservation system is fair	90.8	7.9	1.3	664
The bureau of Land Management should not limit visitation of Aravaipa Canyon Wilderness	2.4	5.2	92.5	664
Three days and two nights is the right amount of time to enjoy Aravaipa Canyon Wilderness	60.7	19.0	20.3	663
The current policy which limits visitation in ACW to fifty people at any one time is okay	72.6	10.1	17.3	655
The daily use fee of \$1.50 per person per day is okay	80.3	5.5	14.1	635
People should be able to reserve a permit more than six months in advance	8.9	24.6	66.5	642
Six months is too far in advance to be able to reserve a permit	25.0	30.7	44.3	642
Assigned campsites should be required at Aravaipa Canyon Wilderness	12.3	21.8	65.9	663
The rangers should patrol more often in ACW	14.4	54.0	31.6	660
Campfires should continue to be allowed in ACW	69.3	17.6	13.1	653
The restriction banning discharge of firearms in the main canyon bottom should continue	98.2	1.3	0.5	661
Horseback travel in ACW should continue to be restricted to day-use only <sup>1</sup>	75.3	13.9	10.4	656
Pets should be allowed in ACW	9.3	14.9	75.5	660

<sup>1</sup>Some respondents expressed a desire for all horse use to be prohibited.

advance reservation periods tend to favor people with fairly stable lifestyles who, consequently, are able to plan their schedules well into the future. They also propose that professionals and students tend to have variable future commitments and may be effectively screened out by long advance reservation periods (Stankey and Baden 1977). We found no association between respondents being professionals or students and (1) whether they used their permit and (2) their response to the statement "6 months is too far in advance to be able to reserve a permit." The hypothesis suggested by Stankey and Baden (1976) appears not to have held for our sample. (This result may, however, be confounded by the absence in the sample of people who could not plan six months in advance and thus could not request a permit or confirm their reservation [e.g. people who were screened from our sample by the reservation system]).

Written comments about the reservation system generally supported a shorter advance period. Some respondents suggested that a set number of permits be set aside for walk-ins.

**ATTITUDES TOWARD THE USE LIMIT** Although most respondents (73%) favored the current use limit of 50 people at any one time (table 9), they expressed a dislike of being in the canyon when it is at capacity. Fifty-six percent of the sample reported that they would dislike having 21-30 people in ACW (see question 5, appendix 1). For hypothetical use levels above 30 people, the figure jumped to 84%.



**TABLE 10**  
**Mean length of stay, visitation limit, daily use fees, and reservation periods suggested by respondents who disagreed with selected direct management policies.**

	MEAN (RANGE)	95% C.I.	N
Right amount of time to spend in ACW	4.60 (0-14 days)	4.33-4.87	134
Better visitation limit for ACW	41.33 (0-307 people)	34.10-48.56	113
Fee willing to pay per person per day	3.82 (\$.25-\$25.00)	3.03-4.61	94
Reserve ___ months (more than six) in advance	11.86 (9-18 months)	11.40-12.32	38
Reserve ___ months (less than six) in advance	2.50 (1-4 months)	2.37-2.63	159

of the respondents (table 9). Twenty percent of the sample disagreed with the limit and proposed an alternative of five days on the average (table 10). Written comments also reflected the desire for more time in the wilderness. Many people wrote that they felt rushed in their efforts to cover the wilderness area in the allotted time. Thirty-six percent of the visitors spent the entire three day limit in ACW. Assumedly, a percentage of these visitors would have preferred a longer visit. Some respondents suggested that a percentage of permits be set aside for people who wish to visit ACW for longer periods of time.

**ATTITUDES TOWARD OTHER DIRECT REGULATION ISSUES** We also queried people about policies toward assigned campsites, campfires, firearms, horseback travel, and pets (table 9). Respondents apparently enjoyed the freedom associated with choosing their own campsites: only 12% of the sample supported the idea of assigned campsites. Sixty-six percent disagreed with such a policy. Continuation of the policy of allowing campfires was supported by 69% of the respondents, with 18% and 13%, respectively, expressing neutral or contrary opinions. Fires were desired by respondents for aesthetic reasons (e.g. having the traditional evening campfire), for keeping warm in cooler months, and for cooking. Many respondents cited the abundance of driftwood in support of not banning fires in ACW. On the other hand, a few people reported a scarcity of firewood and suggested at least seasonal bans on campfires.

This dichotomy of attitudes toward the use limit and actual use levels, although superficially irrational, may reflect a desire to avoid further restrictions on visitation (and thus not increase regimentation on the area). The 17% of the respondents who disagreed with the current use limit were more congruent in their preferences for restrictions and use levels: they suggested a lower limit (mean=41 people, see table 10).

### **ATTITUDES TOWARD THE LENGTH OF STAY LIMITATION**

The current length of stay limitation of 3 days and 2 nights was acceptable to 61%

**TABLE 11**  
**Reasons provided by respondents for being unable to use their permits N=56.**

ADMINISTRATIVE	% OF NO-SHOWS
Couldn't bring pets	3.6
Did not know what to expect, unprepared	1.8
Road/access point problems	5.4
ENVIRONMENTAL	
Raining	5.4
Flooding	5.4
Cold	3.6
PERSONAL	
Schedule change	62.5
Illness	8.9
Mechanical (car breakdown, etc.)	3.6

The policy against firearms was strongly supported: 98% of the respondents agreed with the policy. Only 0.5% disagreed. Safety considerations, noise, and objections to hunting in ACW prompted respondents to oppose firearms. Three-quarters of our respondents agreed that horseback travel should be limited to day use only, 10% disagreed.<sup>7</sup> This result is understandable because only 2% of the sample used horses in any manner during their trip and at least 94% of the sample hiked. Hikers expressed animosity toward horseback riders because of damage done to trails and vegetation by horses, and the wastes left behind by the animals. Allowing pets in ACW was supported by only 9% of our sample, while 76% objected to such a policy. The policy against pets was reason enough for some people to not visit ACW: 3% of the no-show population did not use their permit because they couldn't bring their pet (table 11). People who favored allowing pets typically cited their animals' good behavior, need for exercise, the comfort of additional security, and the benefits of providing "wild" experiences for pets (in all cases

dogs) as reasons for their attitude. Opponents of pets typically cited ecological and social annoyance factors in support of their belief.

**INFLUENCE OF DIRECT REGULATORY METHODS ON THE RECREATION CHOICES OF RESPONDENTS** Lime's (1976) hierarchy assumes that, in visitors' perceptions, management of a wilderness area is by default intrusive: the more management, the more intrusive. In the extreme, visitors may decide not to visit an area that has become too regulated. To evaluate whether this assumption is true for ACW, we tested the hypothesis that respondents' decisions to visit ACW (i.e. use their permits) were related to their attitudes about the permit and reservation system, visitation limit, length of stay limit, and daily use fee. Only attitudes toward the stay limit were significantly associated ( $p < .05$ ) with the use permit/don't use permit decision. Respondents who disagreed with the current use limitation (3 days/2 nights) were more likely to not use their permit than people who agreed with the limit.<sup>8</sup>

Even though this association exists, no-shows and visitors showed no significant difference in preferences for an alternative length of stay limitation.<sup>9</sup> Based on these analyses, we concluded that the stay limitation may have had some effect on respondents' choices to use their permits. But, because no-shows and visitors had equivalent preferences for a alternative stay limit, the two subpopulations were indiscernible with regard to this variable. Other analyses have found no-shows and visitors to be the same on a variety of demographic and other variables. Therefore, although the length of stay limit may have affected the recreation choices of our respondents, the end result makes for a moot issue: it had no effect on the subpopulation mix visiting ACW. Furthermore, when questioned about reasons for not using a permit, no respondents cited the limit as a reason for not using their permit (table 11). Most people gave personal schedule changes as the reason.

**TABLE 12**  
Use of 10 sources of information  
in preparing for a trip to ACW. (N=665)

	DIDN'T USE	NOT HELPFUL	A LITTLE HELPFUL	MODERATELY HELPFUL	VERY HELPFUL
Permit Brochures	20.7%	0.7%	11.5%	25.7%	41.4%
Ranger	43.4	1.8	14.5	18.0	22.2
BLM Receptionist	46.6	3.0	17.2	18.3	15.0
Magazines	76.1	2.0	9.8	6.0	6.1
Friends	30.8	1.9	18.6	20.3	28.3
Family	77.8	4.3	5.4	6.0	6.5
Experience	48.7	0.7	3.7	7.0	39.9
Television	91.1	3.7	3.0	0.6	0.8
Newspaper	79.3	3.7	11.0	3.7	2.3
Other Visitors	56.6	2.6	19.0	15.8	6.0

Our analyses do not, however, settle the issue about whether or not direct regulatory methods are dissuading people from visiting ACW. Our sample only included people who had made a conscious choice (at least to an extent) to accept the system. People who chose not to interact with the system did not attempt to obtain a permit to visit ACW and, thus, were self-selected out of our sample.

## INDIRECT REGULATION OF USE

Indirect regulation of use is the least intrusive of the three methods and thus imposes little regimentation. The primary technique employed in indirect regulation is information and education. Through information and education programs managers can attempt to instill knowledge of low-impact methods of recreation participation (Brown, McCool, and Manfredi 1987; Stankey and Schreyer 1987) and minimum-impact behavior patterns in visitors (Brown, McCool, and Manfredi 1987). An additional indirect technique is setting eligibility requirements by establishing use fees. Such fees impose a monetary cost on wilderness recreation and ration recreation opportunities to those who are willing to shoulder the cost (Stankey and Baden 1977). Both of these indirect methods were employed at ACW during the study period.

**INFORMATION AND EDUCATION** Along with the permit to enter ACW, potential visitors are mailed a brochure that describes the natural and cultural history of ACW, and outlines cautions and precautions for visiting the desert canyon. It also defines what a wilderness area is. A

sheet is included that lists management regulations for the area. During part of the survey period, permittees were mailed brochures on minimum impact camping techniques and water quality preservation. (See appendix 1 for a typical permit packet.)

The intended purpose of including this information was to help visitors have the safest trip possible with the least possible impact on the ecology of the area. To judge whether or not the information accomplished its intended purpose, two questions must be answered. First, did visitors use the information provided by management? And, second, if they used the information, did it influence their behavior?

**TABLE 13**  
Use of permit brochures to prepare for a trip to ACW  
compared to the experience level  
of the respondents. (N=634)

	0-1 VISITS TO ACW	2 OR MORE VISITS TO ACW
USED BROCHURE	230.95	276.48
DID NOT USE BROCHURE	93.91	32.94

We found that the permit brochures were used by all but 21% of our respondents in preparing for their trip (table 12). Of the people who used the brochures, 85% found them to be at least moderately helpful. Interestingly, respondents who had never visited ACW before the study period were more likely to not use the brochures than respondents who had visited at least once (table 13).<sup>10</sup> Nevertheless, the brochures were used by and were useful to most respondents. In fact, they were the most utilized of the 11 sources of information listed in the questionnaire (see question 11, appendix 1). Other important sources of information were friends,

previous experience, rangers, other visitors, and the receptionist in Safford.

We cannot extensively judge whether or not information provided by the BLM influenced visitors' behaviors since the questionnaire was not set up for such a task. We can, however, examine visitors' behavior with regard to purification of water. The permit brochure warns visitors to "always purify stream water before use" (emphasis in brochure). Furthermore, signs at both entrances advise visitors to purify water. Of the 48% of the visitor population who reported that they drank from Aravaipa Creek, 85% said that they purified the water. Assuming that these respondents were accurately reporting their behavior, these rates demonstrate fairly good compliance with the BLM advisory. But the rates must be interpreted with caution: visitors could have learned from sources other than the BLM that all natural waters should be purified. More detailed research on this topic would be required to probe the relationship between information provided by the BLM and behaviors of visitors.

**USE FEES** Stankey and Baden (1977) regard use fees as a tool for rationing recreation opportunities among potential visitors. Although the fee at ACW was not established for this purpose, it could have the effect of rationing visitation (ie. some people may be dissuaded by the \$1.50 fee). We found no evidence that the current fee structure discouraged any permit holders from visiting ACW. The fee was strongly supported: 80% of the respondent population agreed with the statement "the daily use fee of \$1.50 per person is ok." Furthermore, respondents who disagreed with the statement suggested a higher fee (mean=\$3.82, see table 9) and no-shows who disagreed with the \$1.50 fee suggested an alternative which was not significantly different from the fee suggested by visitors.<sup>11</sup> Finally, no respondents cited the fee as a reason for not using their permit.<sup>12</sup>

## SUMMARY AND CONCLUSIONS

The BLM has implemented a spectrum of management techniques in ACW, from highly intrusive site management methods to relatively non-intrusive, indirect regulation of use techniques. Its management style, though, relies primarily on moderately intrusive, direct management of use policies and actions. Our research indicates that permit holders strongly endorse all of the techniques currently employed at Aravaipa, and many would support adoption of stricter regulations and installation of some site developments. Most respondents recognized that restrictions are necessary to provide recreation opportunities of a particular quality and to ration opportunities to visit ACW among competing users. As stated by one frequent user:



*Aravaipa is a jewel, and it should be protected at almost any cost. Ultimately, I would be willing to submit to some draconian measures to keep seeing it in a pristine state (higher fees, fewer visitors allowed at one time, no campfires, checking my trash in and out, etc). I'm looking forward to taking my children and grandchildren there, and I don't want it to have degraded as a result of human visitors.*

We offer the following conclusions about the managerial setting at Aravaipa Canyon Wilderness:

1. Signs and cattle fences, currently the only site management techniques employed in ACW, were favored by most respondents. Cattle fences were liked simply because they keep an undesirable entity--cattle--out of the wilderness. Signs were favored because of their informational value. Inexperienced visitors, who were unfamiliar with the wilderness area, particularly endorsed signs. From our survey results and informal comments offered by visitors, we concluded that a majority of visitors desire more signs in ACW.<sup>13</sup> Informational signs, specifically those designating locations and distances, were particularly desired. A few respondents suggested that interpretive signs would also be beneficial. In light of BLM policy regarding signage in wilderness areas, the practical difficulties of maintaining signs in the flood-prone corridor zone, the impact of signs on wilderness aesthetics, and the wishes of a number of visitors (particularly experienced visitors) that signs not be installed, though, we are not advocating their installation. Other techniques suggested in the research summary (pages 13-21) could be used to accomplish the same objectives as signs.
2. Installation of toilet facilities, a site management development previously found but not currently present in ACW, was recommended by a significant minority of visitors. They supported installation of toilets in heavily used areas for health and aesthetic reasons. A number of visitors brought to our attention that improper waste disposal by visitors was leaving unsightly reminders of human occupation around popular campsites and was probably contaminating water sources. Because these comments were from experienced backcountry travellers and because of the demonstrated influence of encountering human wastes on recreational experiences (chapter 5), we recommend in the research summary (pages 13-21) that construction of toilet facilities at heavy use areas be considered.
3. Although official patrols represent the most intrusive of the direct regulation of use techniques employed in ACW, rangers were well liked by most respondents. As sources of information, education, and security, and as part of the wilderness setting, rangers were, to most visitors, an integral, and probably indispensable, attribute of Aravaipa Canyon Wilderness.
4. Ranger patrols were, however, more desirable in the canyon corridor zone of the wilderness than in the side canyon or rimlands zones. In these areas, opportunities for solitude and challenge were valued possibly more than the potential contacts with rangers. This result demonstrates that managerial techniques that are successful in one part of a wilderness area may not be as well received in other parts of the wilderness.
5. The need for the permit and reservation system and other use restrictions was strongly supported by the respondents. Furthermore, the way the current restrictions have been implemented in ACW was also strongly approved. Many respondents did, however, suggest a shorter advance reservation period and a longer length of stay limitation. Their suggestions are addressed in the research summary (pages 13-21).
6. Other direct regulatory policies (bans on pets and discharging firearms, allowing campfires, and regulating horseback use) were generally supported by the respondents. Only a proposal for assigned campsites, which would greatly restrict individual freedoms of visitors, was disfavored. Many respondents commented on how much they enjoy the



freedom to camp anywhere they desire in ACW. Given support for all of the currently implemented policies, their continuation seems to be in order.<sup>14</sup>

7. Informational and educational materials provided with permits, the primary indirect regulation of use method employed at ACW, were helpful to most respondents. How much was gained from these materials could not be determined from our research, though. Other sources of information were less frequently used, but nevertheless, were helpful. Information and education has great potential at ACW and is given attention in the research summary (pages 13-21).
8. The daily use fee, the other indirect regulatory method used at ACW, was endorsed by most visitors. Those who disagreed with the fee (a significant minority) tended to suggest a higher one. The use fee is discussed in the research summary (pages i-ix) with regard to ways of adjusting the use limitation and modifying the permit and reservation system.
9. We found no evidence in our respondent population that management policies discouraged permit holders from visiting ACW. As noted many times previously, though, the population from which we drew our sample was a site-induced product (in the terminology of Becker, Jubenville, and Burnett [1984]). Its members chose to accept the policies pertaining to ACW by submitting to the permit and reservation system. Consequently, we cannot state whether certain types of visitors have been displaced out of the wilderness. Possibly, visitors who abhor restrictions on recreational use of wilderness have been displaced from and thus will not visit ACW.<sup>15</sup> This conclusion has two managerial implications. First, by imposing restrictions on visitation of the wilderness area, the BLM has chosen to manage for visitors who will accept such restrictions. As with nearly all actions that an agency takes, imposing restrictions favors one constituency over another constituency. Second, care must be taken in extrapolating the results of this report to wildernesses that are not as highly regulated as ACW. Similar support for Aravaipa's management program may take years to garner and could be controversial, depending upon the local visitor population. Also, where use pressures are not as extreme, the managers may wish to provide opportunities for visitors who value a lack of restrictions on wilderness visitation.

Overall, the respondents endorsed how the Bureau of Land Management is managing Aravaipa Canyon Wilderness. They well accepted its actions and policies, neither of which appeared to negatively influence their recreational experiences. In the research summary (pages i-ix), building from this premise, we suggest refinements, rather than extensive overhauls, of the current management program at ACW.

## ENDNOTES

1. Although portable toilets were used in ACW at one time, they are no longer present in the wilderness area. One toilet located near Virgus Canyon was removed before the survey began.
2. The association in table two is explained by the odds ratio (.87). This statistic means that the ratio of respondents disliking to liking signs for any level of experience is 87% of the next higher level.
3. BLM wilderness management policy states that use of signs should be minimized (U.S. Bureau of Land Management 1983:31):

*Only a minimum of signs may be provided for the visitor, in combination with availability of accurate maps, route descriptions, brochures, etc. Signs must be provided primarily for visitor safety and resource protection. Signs must not be placed within the wilderness for the convenience of the user... Signs may be erected at trail junctions, showing directions with arrows... Informational and interpretive signs must not be used to mark streams, lakes, mountain peaks, passes, or points of interest.*

4. The BLM is currently conducting an investigation into the biological integrity of ACW's water resources.
5. The rangers at ACW can only enforce regulations to a limited extent. They do not, for example, have the legal authority to issue citations. (The Safford District does, however, have a ranger who can issue citations [Mahoney 1989]).
6. See appendix 2 for a description of how the self-reliance score was constructed.
7. Probably more respondents supported restriction of horseback travel than is reflected in these figures. Many people objected to the presence of horses in ACW at all. Consequently, they disagreed with the day-use only policy and indicated support for a total ban on horseback travel.
8. A saturated logit model ( $L^2=0.00$ ;  $df=0$ ;  $p=1.00$ ) with the use/don't use permit dichotomy as the dependent variable and agree/disagree as the independent variable produced the following equation:

$$\ln(f_{12}/f_{22}) = 1.633 + .341 \cdot \text{STAY},$$

where  $f_{12}/f_{22}$  = the log odds of not using a permit, and  $\text{STAY} = 1$  if agreed with the current limit and 2 if disagreed with the current limit (2 in the equation). We can see from this equation that disagreeing with the stay limitation reduces the log odds of using a permit by .3408 (correspondingly, the real odds are reduced by 28%). Note that the assumption of causality in the equation could be spurious. It is also likely that choosing not to use a permit may influence one's attitude about the length of stay limitation. [ $*p < .05$ ]

9.  $\text{mean}_{\text{visitor}} = 4.59$  days and  $\text{mean}_{\text{no-show}} = 4.75$  days.  $t = -.34$ ,  $df = 130$ , and  $p = .73$ .
10. The odds ratio for table 12 equals .26. This means that the odds of using brochures for new visitors is 26% of the analogous odds for "experienced" visitors.
11. The mean fee suggested by no-shows was \$3.67. Using a t-test, this figure is no different from the mean of \$3.99 suggested by visitors ( $t = 0.46$ ,  $d.f. = 10.72$ ,  $p = .65$ ).
12. Some respondents were dissatisfied with the fee, however. They mainly questioned where the funds were being applied.
13. Near the end of the survey period, the BLM installed signs at the west trailhead that would have alleviated the concerns of some of the respondents.
14. Of course, ecological objectives also influence continuation or re-evaluation of these policies. Our analysis only addresses their sociological implications.
15. That certain types of visitors are displaced out of an area as the setting changes over time has not been demonstrated conclusively (Graefe, Vaske, and Kuss 1984). See also Gleason (1980) and West (1981) for discussions on this topic.



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# **APPENDIX 1: QUESTIONNAIRE AND PICTURE SURVEYS**







## THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721  
School of Renewable Natural Resources  
325 Biosciences East Building

7 March 1988

Steve Moore  
325 Biosciences East Bldg.  
School of Renewable Natural Resources  
University of Arizona  
Tucson, AZ 85721

Aravaipa Canyon Wilderness (ACW) is very popular...thousands of people visit it every year. With popularity comes the need for understanding how people use and feel about ACW. This understanding is essential for proper management of this important natural resource.

You are among a small number of people who have been asked to give your impressions of ACW. The Bureau of Land Management in Safford, Arizona, has provided us with a list of people who obtained a permit to visit ACW. Your name was selected randomly from this list. Please complete the enclosed questionnaire and return it to us in the envelope provided. So that the results will truly represent the attitudes of all visitors to ACW, it is important that each questionnaire be completed and returned. Your input, then, is very important.

Even if you were unable to use your permit and visit ACW, we need your input. Your responses to the questionnaire will help us understand why people are unable to use their permits. We are also interested in learning about your impressions of ACW as a prospective visitor. Please complete the first eight pages of the questionnaire. You will be directed on page eight when to stop. If you were able to use your permit and visit ACW, please complete the remainder of the questionnaire. Your input will help us understand how recent visitors feel about ACW.

You may be assured of complete confidentiality. The questionnaire has an identification number for mailing purposes only. This is so that we may check it off on the mailing list when your questionnaire is returned. Your name will never be placed on the questionnaire, nor will your responses ever be associated with your name.

If you have any questions or comments concerning the questionnaire, please write or call. The telephone number is (602)621-5508.

The results of this research will be made available to the Bureau of Land Management and other agencies that manage wildland areas. These agencies will use this information to improve current management programs and to design new programs for use in Arizona and throughout the United States.

Thank you for your assistance.

Sincerely,

A handwritten signature in cursive script, appearing to read "Steve Moore".

Steve Moore  
Research Associate



## THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721  
School of Renewable Natural Resources  
325 Biosciences East Building

28 March 1988

Steve Moore  
325 Biosciences East Bldg.  
School of Renewable Natural Resources  
University of Arizona  
Tucson AZ 85721

About three weeks ago I wrote to you seeking your impressions of Aravaipa Canyon Wilderness (ACW). As of today, we have not received your completed questionnaire.

Our research unit has undertaken this study to provide information to the Bureau of Land Management, which manages ACW, and to other agencies that manage wildland areas. This information will be used by these agencies to improve existing management programs or to develop new ones.

I am writing to you again because of the significance each questionnaire has to the usefulness of this study. Your name was drawn through a scientific sampling process in which each permit holder had an equal chance of being selected. Only a small sample was selected. For the results of this study to be truly representative of the attitudes of all permit holders, it is essential that each person in the sample return their questionnaire. As mentioned in our last letter, even if you did not use your permit and visit ACW, your input to one-half of the questionnaire is needed. If you did use your permit and visit ACW, your input on the entire questionnaire is needed.

I am aware of the time and effort our questionnaire requires of our respondents—it is a lengthy questionnaire. Accordingly, each response is truly appreciated. I can assure you that every question is important to our study and addresses important issues regarding wilderness management.

In the event that your questionnaire has been lost, a replacement is enclosed. Please write or call if you have any questions. My telephone number is (602)621-5508.

Your cooperation is greatly appreciated.

Cordially,

A handwritten signature in cursive script, appearing to read "Steve Moore".

Steve Moore  
Research Associate



## THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721  
School of Renewable Natural Resources  
325 Biosciences East Building

25 April 1988

Steve Moore  
325 Biosciences East Bldg.  
School of Renewable Natural Resources  
University of Arizona  
Tucson AZ 85721

I am writing to you about our study of people's impressions of Aravaipa Canyon Wilderness (ACW). We have not yet received your completed questionnaire.

The large number of questionnaires that have been returned is very encouraging. We realize that our questionnaire demands a lot of our respondents—it is rather lengthy. We truly appreciate the time and effort put into each response.


But whether we will be able to describe accurately how permit holders feel about ACW depends on you and the others who have not responded. Our past experiences with similar surveys suggest that those of you who have not yet sent in your questionnaire may have quite different impressions of ACW than those who have.

Even if you did not use your permit to visit ACW, we need your response. An important part of our study is finding out why people are unable to visit ACW and what their attitudes toward ACW are. If you are one of these people, please fill out the first eight pages of the questionnaire and return it to me. Of course, if you used your permit and visited ACW, we also need your response. Please fill out the entire questionnaire and return it to me.

This is the first study of this type that has ever been done for ACW. Therefore, the results are of particular importance to the Bureau of Land Management (who manages ACW) and other agencies that manage wildland areas. These agencies will use the results to improve current programs, and design new programs for managing visitation of ACW and other, similar areas. The usefulness of our results depends on how accurately we are able to describe how permit holders feel about ACW.

For this reason, I am sending you this reminder about our study. In case our other correspondence has been misplaced or lost, a replacement questionnaire is enclosed. May I urge you to complete and return it to us as quickly as possible? Thank you.

Sincerely,

  
Steve Moore  
Research Associate



Last week a questionnaire seeking your impressions of Aravaipa Canyon Wilderness (ACW) was mailed to you. Your name was drawn in a random sample of people who have obtained permits to visit ACW.

If you have already completed and returned the questionnaire to us, please accept our sincere thanks. If not, please do so today. The questionnaire has been sent to only a small, but representative, sample of permit holders. It is extremely important that your responses also be included in the study if the results are to accurately represent the attitudes of people who visit, or may visit, ACW.

If by some chance you did not receive the questionnaire, or if it got misplaced, please call collect (602-621-5508) and I will get another one in the mail to you immediately.

Sincerely,

Steve Moore  
Research Associate

## ARAVAIPA CANYON WILDERNESS RECREATION VISITOR SURVEY



Return your completed questionnaire in the envelope provided to:

ACW SURVEY

SCHOOL OF RENEWABLE NATURAL RESOURCES  
UNIVERSITY OF ARIZONA

325 Biosciences East Building Tucson, AZ 85721

PLEASE NOTE:

In this questionnaire, AOW refers to Aravaipa Canyon Wilderness

Q-1 The Bureau of Land Management is a federal agency, manages Aravaipa Canyon Wilderness (AOW). Based on the contact you have had with the Bureau of Land Management, how would you rate their management of AOW? (Please circle one number.)

- 1 VERY GOOD  
2 GOOD  
3 NEUTRAL  
4 BAD  
5 VERY BAD

Q-2 Assume that you are going to take an overnight trip to AOW in the near future. Following is a list of conditions you could encounter during your trip. For each condition, circle one number that best expresses how much you would like to encounter that condition in AOW.

	Circle one number for each statement.				
	Strongly Dislike	Dislike	Neutral	Like	Strongly Like
a. Smoke from campfires in Aravaipa Canyon	-2	-1	0	+1	+2
b. Charred logs and ash from campfires	-2	-1	0	+1	+2
c. Light from other visitors' campfires at night	-2	-1	0	+1	+2
d. Litter at campsites	-2	-1	0	+1	+2
e. Litter along travel routes	-2	-1	0	+1	+2
f. Cattle in Aravaipa Canyon	-2	-1	0	+1	+2
g. Aircraft flying low overhead	-2	-1	0	+1	+2
h. Toilet facilities at popular campsites	-2	-1	0	+1	+2
i. Campsites concentrated in camp areas	-2	-1	0	+1	+2
j. Campsites dispersed throughout AOW	-2	-1	0	+1	+2
k. Interpretive or directional signs at points of interest	-2	-1	0	+1	+2
l. Maintained trails	-2	-1	0	+1	+2
m. Cattle fences at wilderness boundaries	-2	-1	0	+1	+2
n. Damaged trees or other vegetation	-2	-1	0	+1	+2
o. Manure from livestock	-2	-1	0	+1	+2
p. Human feces or toilet paper on the ground	-2	-1	0	+1	+2
q. Rock fire rings at campsites	-2	-1	0	+1	+2
r. Graffiti on rocks, trees, etc.	-2	-1	0	+1	+2

Q-3 People engage in a variety of recreational activities at AOW. Some of these activities are listed below. Again, assume that you are going to take a trip to AOW in the near future. For each activity, circle one number that best expresses how much you would like to engage in that activity during your trip to AOW.

	Circle one number for each activity.				
	Strongly Dislike	Dislike	Neutral	Like	Strongly Like
a. Walking in Aravaipa Creek	-2	-1	0	+1	+2
b. Talking with rangers	-2	-1	0	+1	+2
c. Swimming in Aravaipa Creek	-2	-1	0	+1	+2
d. Hiking in side canyons	-2	-1	0	+1	+2
e. Hiking to the canyon rim	-2	-1	0	+1	+2
f. Swimming in pools in side canyons	-2	-1	0	+1	+2
g. Camping overnight alone	-2	-1	0	+1	+2
h. Drinking water from Aravaipa Creek	-2	-1	0	+1	+2
i. Observing and identifying birds	-2	-1	0	+1	+2
j. Sitting around a campfire	-2	-1	0	+1	+2
k. Photographing the scenery	-2	-1	0	+1	+2
l. Observing and identifying mammals	-2	-1	0	+1	+2
m. Being in the canyon at night	-2	-1	0	+1	+2
n. Climbing rocks	-2	-1	0	+1	+2
o. Identifying plants	-2	-1	0	+1	+2
p. Examining the geology	-2	-1	0	+1	+2
q. Observing and identifying reptiles and amphibians	-2	-1	0	+1	+2
r. Studying archeological artifacts	-2	-1	0	+1	+2
s. Hunting	-2	-1	0	+1	+2
t. Nude sunbathing or nude swimming	-2	-1	0	+1	+2
u. Hiking alone	-2	-1	0	+1	+2
v. Seeing a flood in AOW	-2	-1	0	+1	+2
w. Photographing animals	-2	-1	0	+1	+2
x. Observing and identifying fish	-2	-1	0	+1	+2
y. Riding horses	-2	-1	0	+1	+2
z. Hiking with packstock	-2	-1	0	+1	+2

Q-4 People have different requirements for social interaction when they visit a wilderness area. How important would the following requirements be to you during a trip to AOW?

	Circle one number for each requirement.				
	NOT IMPORTANT	SLIGHTLY IMPORTANT	MODERATELY IMPORTANT	VERY IMPORTANT	
a. Being alone	1	2	3	4	
b. Being on your own	1	2	3	4	
c. Being near others who can help if you need them	1	2	3	4	
d. Being with friends and/or family	1	2	3	4	
e. Knowing that rangers are on patrol	1	2	3	4	

Q-5 Following is a list of social situations you could encounter during a visit to AOW. Assume that you are taking an overnight trip to AOW. For each situation, circle one number that best expresses your attitude about encountering that situation.

	Circle one number for each situation.				
	STRONGLY DISLIKE	DISLIKE	NEUTRAL	LIKE	STRONGLY LIKE
a. No one else at all in AOW	-2	-1	0	+1	+2
b. One to ten people in the main canyon	-2	-1	0	+1	+2
c. Eleven to twenty people in the main canyon	-2	-1	0	+1	+2
d. Twenty-one to thirty people in the main canyon	-2	-1	0	+1	+2
e. More than thirty people in the main canyon	-2	-1	0	+1	+2
f. One small group camped near your campsite	-2	-1	0	+1	+2
g. One medium sized group camped near your campsite	-2	-1	0	+1	+2
h. One large group camped near your campsite	-2	-1	0	+1	+2
i. A group of people in a side canyon	-2	-1	0	+1	+2
j. Two or more groups of people in a side canyon	-2	-1	0	+1	+2
k. A group of people on the rimlands	-2	-1	0	+1	+2
l. Two or more groups of people on the rimlands	-2	-1	0	+1	+2
m. A group of people within a mile of either trailhead	-2	-1	0	+1	+2
n. People at the trailheads	-2	-1	0	+1	+2
o. A ranger on patrol in the main canyon	-2	-1	0	+1	+2
p. A ranger on patrol in a side canyon	-2	-1	0	+1	+2
q. A ranger on patrol on the rimlands	-2	-1	0	+1	+2

Q-6 Assume that you are staying in AOW for one day. How many times would you find it acceptable to encounter each of the following groups of people during your stay in AOW?

	Circle one response for each group				
	ZERO TIMES	ONE TO TWO TIMES	THREE TO FIVE TIMES	SIX TO TEN TIMES	MORE THAN TEN TIMES
a. A small group (1-3 people)	0	1-2	3-5	6-10	10+
b. A medium size group (4-6 people)	0	1-2	3-5	6-10	10+
c. A large group (7 or more people)	0	1-2	3-5	6-10	10+
d. A group of hunters	0	1-2	3-5	6-10	10+
e. A group of horseback riders	0	1-2	3-5	6-10	10+
f. A group of hikers with packstock	0	1-2	3-5	6-10	10+
g. Nude sunbathers or nude swimmers	0	1-2	3-5	6-10	10+
h. A youth group	0	1-2	3-5	6-10	10+
i. A school class on a field trip	0	1-2	3-5	6-10	10+
j. A ranger on patrol	0	1-2	3-5	6-10	10+

Q-7 Currently, you are required to obtain a permit from the Bureau of Land Management in Safford before you can use AOW. You may reserve a permit up to six months in advance. Visitation in AOW is limited to 50 people at any one time. Stays are restricted to three days and two nights. A daily use fee of \$1.50 per person is also in effect. Rangers are stationed at each end. They provide information to visitors and check permits. By circling the appropriate response for each statement, please tell us your attitudes toward these management policies.

	Circle one response per statement	
The reservation system is easy to understand. . . . .	AGREE	DISAGREE
The reservation system is fair. . . . .	AGREE	DISAGREE
The Bureau of Land Management should not limit visitation of Aravaipa Canyon Wilderness. . . . .	AGREE	DISAGREE
Assigned campsites should be required in Aravaipa Canyon Wilderness. . . . .	AGREE	DISAGREE
The rangers should patrol more often in AOW. . . . .	AGREE	DISAGREE
Three days and two nights is the right amount of time to enjoy Aravaipa Canyon Wilderness. . . . .	AGREE	DISAGREE

→ If you disagreed, what would be the right amount of time? \_\_\_\_\_

Question Q-7 continued on the next page →

← Question Q-7 continued from the previous page

The current policy which limits visitation in AOW to fifty people at any one time is ok... AGREE NEUTRAL DISAGREE

If you disagreed, what limit would be better? PEOPLE AT ANY ONE TIME

The daily use fee of \$1.50 per person is ok... AGREE NEUTRAL DISAGREE

If you disagreed, what fee would you be willing to pay?

People should be able to reserve a permit more than six months in advance... AGREE NEUTRAL DISAGREE

If you agreed, how long in advance do you think reservations should be accepted? MONTHS

Six months is too far in advance to be able to reserve a permit... AGREE NEUTRAL DISAGREE

If you agreed, how long in advance do you think reservations should be accepted? MONTHS

Campfires should continue to be allowed in AOW... AGREE NEUTRAL DISAGREE

The restriction banning the discharge of firearms in the main canyon bottom should continue... AGREE NEUTRAL DISAGREE

Horseback travel in AOW should continue to be restricted to day-use only... AGREE NEUTRAL DISAGREE

Pets should be allowed in AOW... AGREE NEUTRAL DISAGREE

Q-8 How many times have you visited Aravaipa Canyon Wilderness (ACW)?

DURING THE PAST TWELVE MONTHS ... TIMES

DURING THE PAST 36 MONTHS... TIMES

DURING YOUR LIFETIME? (approximately) ... TIMES

Q-9 How often do you visit wilderness areas during one year? (Please circle one number.)

1 MORE THAN 10 TIMES A YEAR

2 6-9 TIMES A YEAR

3 3-5 TIMES A YEAR

4 1-2 TIMES A YEAR

5 I USUALLY DON'T VISIT WILDERNESS AREAS

What other wilderness areas in Arizona do you normally visit?

Q-10 How did you first find out about AOW? (Please circle any numbers that apply.)

1 FROM A MAGAZINE

2 FROM FRIENDS

3 FROM FAMILY

4 FROM TV

5 FROM A BROCHURE

6 FROM A NEWSPAPER

7 OTHER

Q-11 How much do the following sources of information help you prepare for a visit to AOW? For example, how much do these sources of information help you understand rules and regulations, decide where to hike or camp, and/or learn about natural hazards in AOW?

	Circle One Number for Each Component			
	DIDN'T USE	NOT HELPFUL	A LITTLE HELPFUL	MODERATELY HELPFUL
a. Magazine	0	1	2	3
b. Friends	0	1	2	3
c. Family	0	1	2	3
d. Previous experience in AOW	0	1	2	3
e. TV	0	1	2	3
f. Brochures sent with permit packet	0	1	2	3
g. Newspaper	0	1	2	3
h. Ranger(s)	0	1	2	3
i. Other visitors at AOW	0	1	2	3
j. Receptionist in Safford	0	1	2	3
k. Other, _____	0	1	2	3

Q-12 Please indicate why you scheduled your trip reservation when you did. (Circle any numbers that apply.)

1 WEATHER

2 SEASON

3 FAMILY SCHEDULE

4 SCHOOL SCHEDULE

5 WORK SCHEDULE

6 PERMIT AVAILABILITY

7 TO VISIT AOW WHEN IT IS LESS CROWDED WITH PEOPLE

8 TO VISIT AOW WHEN CERTAIN WILDLIFE ARE PRESENT

9 OTHER (Please specify.)

Q-13 How far in advance did you schedule your reservation?

MONTHS



We recognize that some of the following questions are personal in nature. However, your responses will be placed in a large data set--individual information will not be used. Your responses would be most helpful in identifying users and potential users of ACW. Thank you.

Q-14 Are you a member of any of these groups? (Circle any that apply.)

- 1 A NATURE CONSERVATION GROUP  
(Like the Sierra Club)
- 2 A WILDLIFE CONSERVATION GROUP  
(Like the Audubon Society)
- 3 AN ORV CLUB
- 4 A HIKING CLUB
- 5 A FISHING OR HUNTING CLUB
- 6 A YOUTH ORGANIZATION (Like the Girl Scouts)
- 7 OTHER, (please specify): \_\_\_\_\_

Q-15 What is your racial or ethnic group? (Please circle one number.)

- 1 WHITE
- 2 HISPANIC
- 3 BLACK
- 4 NATIVE AMERICAN
- 5 OTHER, (please specify): \_\_\_\_\_

Q-16 Please indicate your sex.

- 1 MALE
- 2 FEMALE

Q-17 What is your highest level of education?

- 1 NO FORMAL EDUCATION
- 2 GRADE SCHOOL
- 3 SOME HIGH SCHOOL
- 4 HIGH SCHOOL GRADUATE
- 5 TRADE SCHOOL
- 6 SOME COLLEGE
- 7 COLLEGE GRADUATE
- 8 SOME GRADUATE WORK
- 9 A GRADUATE DEGREE

Q-18 Please tell us your age. \_\_\_\_\_

Q-19 What is your occupation? \_\_\_\_\_

Q-20 Which of the following best describes where you live?

- 1 LARGE METROPOLITAN AREA, contains city of 500,000 or more, many suburbs, very little open country
- 2 MEDIUM METROPOLITAN, contains city of 150,000 or more, several suburbs, very little open country
- 3 SMALL METROPOLITAN, contains city of 50,000 to 149,999, few suburbs, considerable open country
- 4 SEMI-URBAN, city of 10,000 to 49,999, one or two smaller towns, mostly open country
- 5 SEMI-RURAL, contains city of 2,500 to 9,999, one or two smaller towns, mostly open country
- 6 RURAL, contains town of less than 2,500, surrounded entirely by open country

Q-21 Please indicate your total household income (before taxes).

- 1 UNDER \$6,000
- 2 \$6,000-\$9,999
- 3 \$10,000-\$14,999
- 4 \$15,000-\$19,999
- 5 \$20,000-\$24,999
- 6 \$25,000-\$29,999
- 7 \$30,000-\$34,999
- 8 \$35,000-\$49,999
- 9 \$50,000 OR MORE

Q-22 Were you able to use your permit and visit ACW?

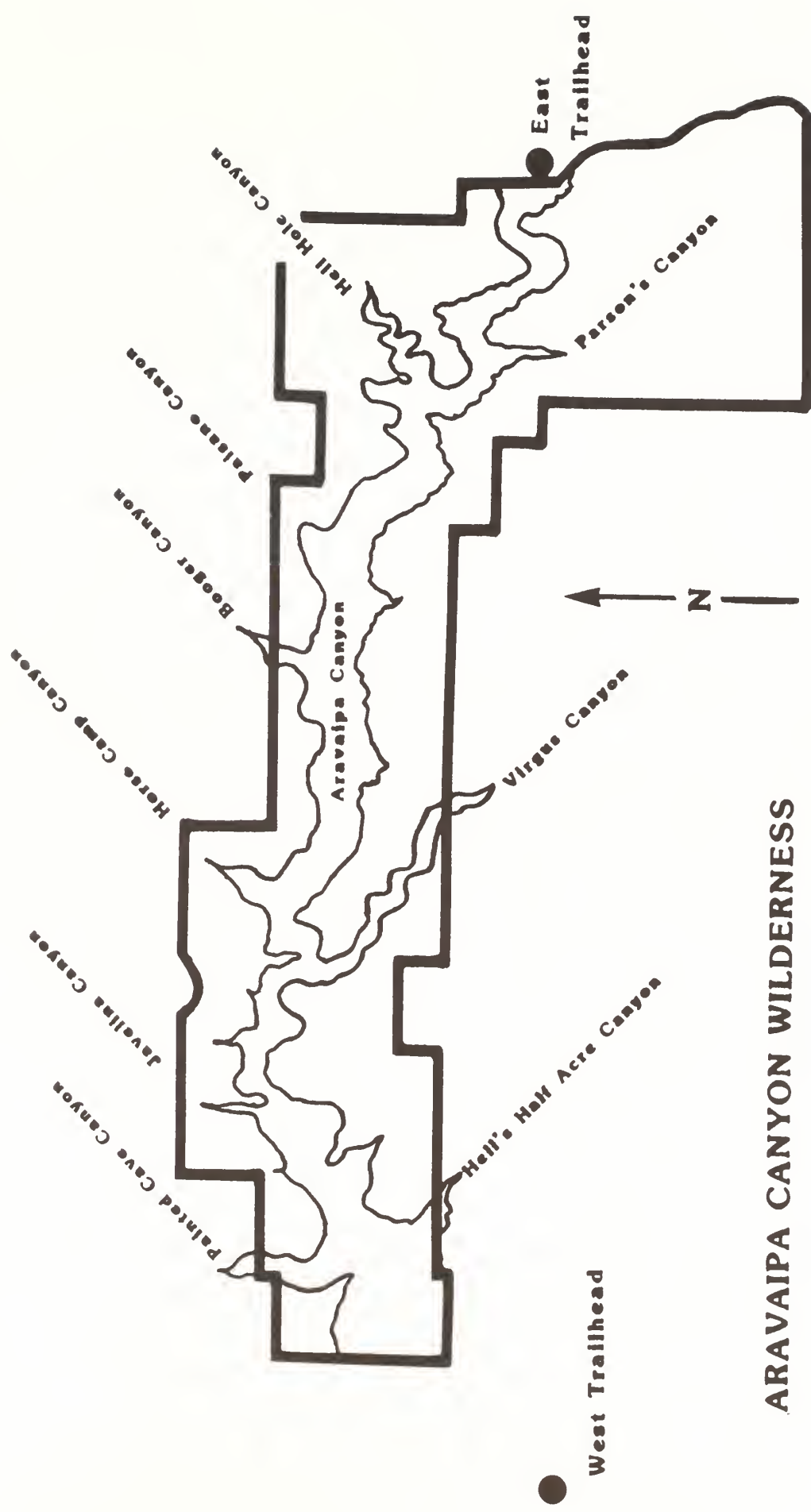
- 1 YES
- 2 NO

If you answered NO, indicate why you were unable to visit ACW. (Please circle one number.)

- 1 MY PERSONAL SCHEDULE (WORK, SCHOOL, ETC.) CHANGED
- 2 OTHER PEOPLE IN MY GROUP COULDN'T GO
- 3 THE TEMPERATURE WAS TOO HOT
- 4 IT WAS RAINING
- 5 ARAVAIPA CREEK WAS FLOODING
- 6 I HEARD THAT ACW IS TOO CROWDED WITH PEOPLE
- 7 I HEARD THAT ACW ISN'T AS NICE AS IT USED TO BE
- 8 OTHER (please specify.) \_\_\_\_\_

You are now finished with the questionnaire. If you have any additional comments to make, please use the space provided on page 18. Thank you for taking the time to provide us with your input--we appreciate it!

If you answered YES, please continue on to question Q-23. →



# ARAVAIPA CANYON WILDERNESS



**— = Wilderness Boundary**

Q-23 On this map, draw the route you took while traveling through ACW during your most recent trip. Mark where you entered "ENTER". Mark where you exited "EXIT". If you camped, mark with a "C1" your first campsite, with a "C2" your second campsite, etc. Circle your favorite campsite. Mark with an "S" places other than campsites where you stopped for a while (an hour or so). Circle your favorite stopping points. Please use a colored pen or pencil if you have one available.

**PLEASE NOTE:** On question Q-30, if you did not see a condition and that is what you prefer, please circle 0. For example, if you saw no litter and you do not prefer to see litter, circle 0, the "ABOUT WHAT I PREFER" category. If you saw more or less of a condition than you prefer, answer appropriately. Thank you.

AOW can be divided into three geographic areas: (1) the main canyon (Aravaipa Canyon); (2) the side canyons which branch off from the main canyon; and (3) the rimlands (the land above the main canyon and side canyons). In this section, we would like to find out about your impressions of these areas. To help you recall where these areas are, please refer to the map on pages 9 and 10.

Q-24 Did you visit the main canyon during your most recent trip to AOW?

- 1 YES
- 2 NO

If you answered NO, skip to question Q-35

Q-25 Please rate the following characteristics of the main canyon (Please circle your rating for each characteristic.)				
Sense of solitude	VERY STRONG	STRONG	MODERATE	WEAK
Feeling of freedom	VERY STRONG	STRONG	MODERATE	WEAK
Sense of discovery	VERY STRONG	STRONG	MODERATE	WEAK
Feeling of untamed wilderness	VERY STRONG	STRONG	MODERATE	WEAK
Sense of security	VERY STRONG	STRONG	MODERATE	WEAK
Feeling of danger	VERY STRONG	STRONG	MODERATE	WEAK
Feeling that no one had ever been there before	VERY STRONG	STRONG	MODERATE	WEAK
Feeling of unspoiled wilderness	VERY STRONG	STRONG	MODERATE	WEAK

Q-26 In the boxes below, please rank in order of importance these elements of the main canyon. (Please rank the five most important elements.)

(Please put the number of the item in the appropriate box.)

<input type="checkbox"/>	MOST IMPORTANT	1 Water
<input type="checkbox"/>	SECOND MOST IMPORTANT	2 Shade
<input type="checkbox"/>	THIRD MOST IMPORTANT	3 Good campsites
<input type="checkbox"/>	FOURTH MOST IMPORTANT	4 Solitude
<input type="checkbox"/>	FIFTH MOST IMPORTANT	5 Ease of hiking
		6 Vegetation
		7 Wildlife
		8 Geology
		9 Archeology
		10 Safety from natural hazards
		11 Challenge
		12 Meeting other visitors
		13 Peace and quiet

Q-27 About how many people (besides people in your party) did you meet or see in the main canyon during your most recent trip? (Please circle one number.)

- 1 NO OTHER PEOPLE
- 2 ONE TO FIVE PEOPLE
- 3 SIX TO TEN PEOPLE
- 4 ELEVEN TO TWENTY PEOPLE
- 5 MORE THAN TWENTY PEOPLE

Q-28 About how many other groups did you meet or see while you were in the main canyon? (Please circle one number.)

- 1 NO OTHER GROUPS
- 2 ONE TO TWO GROUPS
- 3 THREE TO FIVE GROUPS
- 4 SIX TO TEN GROUPS
- 5 MORE THAN TEN GROUPS

Q-29 Approximately how many people were in the largest and smallest groups you met or saw? (If you met or saw other groups.) (Please fill in the blanks.)

Largest: \_\_\_\_\_ PEOPLE  
Smallest: \_\_\_\_\_ PEOPLE

Q-30 By circling the appropriate response, please tell us to what extent you found the following conditions in the main canyon.

Circle one number for each statement.				
A LOT LESS THAN I PREFER	LESS THAN I PREFER	ABOUT WHAT I PREFER	MORE THAN I PREFER	A LOT MORE THAN I PREFER
-2	-1	0	+1	+2
Damaged trees or other vegetation	-2	-1	0	+1
Manure from livestock	-2	-1	0	+1
Human feces or toilet paper on the ground	-2	-1	0	+1
Litter	-2	-1	0	+1
Number of other groups of people	-2	-1	0	+1
Number of large groups of people	-2	-1	0	+1
Rock fire rings	-2	-1	0	+1
Graffiti on rocks, trees, etc.	-2	-1	0	+1
Wildlife	-2	-1	0	+1
Hunters	-2	-1	0	+1
Nude sunbathers or nude swimmers	-2	-1	0	+1
Horseback riders	-2	-1	0	+1
People camping	-2	-1	0	+1
Hikers with packstock	-2	-1	0	+1
Manned structures	-2	-1	0	+1
Rangers on patrol	-2	-1	0	+1
Evidence of campfires	-2	-1	0	+1
Water	-2	-1	0	+1
Low flying aircraft	-2	-1	0	+1
Noisy or rowdy groups	-2	-1	0	+1

Q-31 In general, how would you rate the quality of water in Aravaipa Creek? (Please circle one number.)

- 1 VERY GOOD
- 2 GOOD
- 3 OK
- 4 POOR
- 5 VERY POOR

Q-32 Did you drink water from Aravaipa Creek? (Please circle one number.)

- 1 YES
- 2 NO

→ If you answered NO, skip to question Q-35

Q-33 Did you purify the water? (Please circle one number.)

- 1 YES
- 2 NO

→ If you answered NO, skip to question Q-35

Q-34 How did you purify the water? (Please circle any numbers that apply.)

- 1 BOILING
- 2 CHLORINE
- 3 FILTER
- 4 IODINE
- 5 OTHER (Please specify.) \_\_\_\_\_

Q-35 During your most recent visit, did you visit one or more side canyons?

- 1 YES
- 2 NO

→ If you answered NO, skip to question Q-44

Q-36 Please rate the following characteristics of the side canyons. (Please circle your rating for each characteristic.)

Sense of solitude	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling of freedom	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Sense of discovery	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling of untamed wilderness	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Sense of security	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling of danger	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling that no one had ever been there before	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling of unspoiled wilderness	VERY STRONG	STRONG	MODERATE	WEAK	NONE

Q-37 Why did you visit the side canyons? Please describe your reasons in the space provided below.

Q-38 In the boxes below, please rank in order of importance these elements of the side canyons. (Please rank the five most important elements.)

[Please put the number of the item in the appropriate box.]

☐ MOST IMPORTANT

☐ SECOND MOST IMPORTANT

☐ THIRD MOST IMPORTANT

☐ FOURTH MOST IMPORTANT

☐ FIFTH MOST IMPORTANT

- 1 Water
- 2 Shade
- 3 Good campsites
- 4 Solitude
- 5 Base of hiking
- 6 Vegetation
- 7 Wildlife
- 8 Geology
- 9 Archeology
- 10 Safety from natural hazards
- 11 Challenge
- 12 Meeting other visitors
- 13 Peace and quiet

Q-39 In general, how would you rate the quality of water in side canyon streams and pools. (Circle one number.)

- 1 VERY GOOD
- 2 GOOD
- 3 OK
- 4 POOR
- 5 VERY POOR

Q-40 Did you drink water from streams and pools in side canyons? (Please circle one number.)

- 1 YES
- 2 NO

→ If you answered NO, skip to question Q-44

Q-41 From which side canyon(s) did you drink water? \_\_\_\_\_

Q-42 Did you purify the water? (Please circle one number.)

- 1 YES
- 2 NO

→ If you answered NO, skip to question Q-44

Q-43 How did you purify the water? (Please circle any numbers that apply.)

- 1 BOILING
- 2 CHLORINE
- 3 FILTER
- 4 IODINE
- 5 OTHER (Please specify.) \_\_\_\_\_



Q-44 During your most recent visit, did you visit the rimlands?

1 YES  
2 NO

If you answered NO, skip to question Q-47

Q-45 Please rate the following characteristics of the rimlands. (Please circle your rating for each characteristic.)

Sense of solitude	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling of freedom	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Sense of discovery	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling of untamed wilderness	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Sense of security	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling of danger	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling that no one had ever been there before	VERY STRONG	STRONG	MODERATE	WEAK	NONE
Feeling of unspoiled wilderness	VERY STRONG	STRONG	MODERATE	WEAK	NONE

Q-46 In the boxes below, please rank in order of importance these elements of the rimlands. (Please rank the five most important elements.)

Please put the number of the item in the appropriate box.)

<input type="checkbox"/>	MOST IMPORTANT	1 Water
<input type="checkbox"/>	SECOND MOST IMPORTANT	2 Shade
<input type="checkbox"/>	THIRD MOST IMPORTANT	3 Good campsites
<input type="checkbox"/>	FOURTH MOST IMPORTANT	4 Solitude
<input type="checkbox"/>	FIFTH MOST IMPORTANT	5 Ease of hiking
		6 Vegetation
		7 Wildlife
		8 Geology
		9 Archeology
		10 Safety from natural hazards
		11 Challenge
		12 Meeting other visitors
		13 Peace and quiet

Q-47 Did you meet or see any other people during your visit to AQW?

1 YES  
2 NO

If you answered NO, skip to question Q-50

Q-48 Were there situations where you enjoyed meeting or seeing other people in AQW? (Please circle one number.)

1 YES  
2 NO

If you answered YES, please describe the situation(s) where you enjoyed meeting or seeing other people. Include in your description the location in AQW of any such encounters.

Q-49 Were there situations where you disliked meeting or seeing other people in AQW? (Please circle one number.)

1 YES  
2 NO

If you answered YES, please describe the situation(s) where you disliked meeting or seeing other people in AQW. Include in your description the location in AQW of any such encounters.

Q-50 A variety of plant and animal species inhabit AQW. Some of these species are endangered, threatened, or rare in Arizona. Please tell us what plant and animal species you saw during your most recent trip to AQW. If you saw too many species to write down in the space provided below, you may continue your list on page 18.

PLANTS

MAMMALS

BIRDS

FISH

REPTILES & AMPHIBIANS

Q-51 Please give the dates of your most recent trip:

Beginning: MONTH DAY YEAR Day of week: SU M TU W TH F SA  
Ending: MONTH DAY YEAR Day of Week: SU M TU W TH F SA  
(Circle One) (Circle One)

Q-52 How many people were in your party during your most recent trip?  
(Please circle one number.)

- 1 1-2
- 2 3-4
- 3 5-7
- 4 8-10
- 5 11 OR MORE

Q-53 How many of the people in your party were children (12 years old or under)? (Please fill in the blank.)

\_\_\_\_\_ CHILDREN 12 years old or under

Q-54 On your most recent trip to Aravaipa Canyon Wilderness, what type of group were you with? (Please circle any numbers that apply.)

- 1 FAMILY
- 2 FRIENDS OR ACQUAINTANCES
- 3 ALONE
- 4 ORGANIZED GROUP (Please give the name.) \_\_\_\_\_

Q-55 How did your group travel through AOW? (Please circle one number.)

- 1 HIKE
- 2 RIDE HORSES
- 3 RIDE HORSES AND HIKE
- 4 HIKE AND USE PACKSTOCK
- 5 RIDE HORSES AND USE PACKSTOCK
- 6 HIKE, RIDE HORSES, AND USE PACKSTOCK

Q-56 What activities did you engage in during your most recent trip to AOW?  
(Please circle any numbers that apply.)

- 1 HIKING
- 2 CAMPING
- 3 ROCK CLIMBING
- 4 HUNTING
- 5 SWIMMING
- 6 BACKPACKING
- 7 HORSEBACK RIDING
- 8 BIRDWATCHING
- 9 OBSERVING WILDLIFE OTHER THAN BIRDS
- 10 RELAXING
- 11 PHOTOGRAPHY
- 12 OTHER (Please specify.) \_\_\_\_\_

Q-57 In your opinion, how has AOW been affected by recreational activities?  
(Please circle one number.)

- 1 IMPACTED A LOT
- 2 IMPACTED MODERATELY
- 3 NEITHER IMPACTED NOR IMPROVED
- 4 IMPROVED MODERATELY
- 5 IMPROVED A LOT

Q-58 Overall, how well satisfied were you with your most recent trip to Aravaipa Canyon Wilderness (ACW)? (Please circle one number.)

- 1 VERY SATISFIED
- 2 SATISFIED
- 3 NEUTRAL
- 4 UNSATISFIED
- 5 VERY UNSATISFIED

IF YOU HAVE ANY ADDITIONAL COMMENTS CONCERNING ARAVAIPA CANYON WILDERNESS, PLEASE USE THE SPACE PROVIDED ON THIS PAGE

THANKS AGAIN FOR YOUR HELP!





SCHOOL OF RENEWABLE NATURAL RESOURCES  
UNIVERSITY OF ARIZONA

325 Biosciences East Building    Tucson, AZ 85721

We are conducting research about people's preferences for seeing other people and environmental conditions in Aravaipa Canyon Wilderness.

In this notebook are pictures of people and campsites you could come across in Aravaipa Canyon. For each picture or pair of pictures, you will be asked to make a judgment and mark your response on the answer sheet provided with the notebook. The pictures are organized into sets relating to particular themes. For example, the first set contains pictures of different types of groups of people you could meet or see during a visit to Aravaipa. Near the end of the survey, we also ask you to answer some questions about yourself.

The number for each picture corresponds with the numbers on your answer sheet. PLEASE MARK YOUR RESPONSES ONLY ON THE ANSWER SHEET.

If you have any questions, please ask.

Thank you for your cooperation.

REFER TO PICTURE SET I ON YOUR ANSWER SHEET:

The first set contains pictures of twelve groups of people you could meet or see in Aravaipa Canyon Wilderness. For each group, please mark on your answer sheet how many times you would find it acceptable to meet or see that group during a one day visit. Assume that you are walking toward the group in the picture. Also, assume that you are travelling with the group you are with today.

Please circle only one number.



## ANSWER SHEET

- I. For each group, please mark on your answer sheet how many times you would find it acceptable to meet or see that group during a one day visit. Assume that you are walking toward the group in the picture. Also, assume that you are with the group you are with today.

|Circle one response for each picture|

	ZERO TIMES	ONE TO TWO TIMES	THREE TO FIVE TIMES	SIX TO TEN TIMES	MORE THAN TEN TIMES
1.	0	1-2	3-5	6-10	10+
2.	0	1-2	3-5	6-10	10+
3.	0	1-2	3-5	6-10	10+
4.	0	1-2	3-5	6-10	10+
5.	0	1-2	3-5	6-10	10+
6.	0	1-2	3-5	6-10	10+
7.	0	1-2	3-5	6-10	10+
8.	0	1-2	3-5	6-10	10+
9.	0	1-2	3-5	6-10	10+
10.	0	1-2	3-5	6-10	10+
11.	0	1-2	3-5	6-10	10+
12.	0	1-2	3-5	6-10	10+

- II. For each pair, choose the preferred campsite.

13. LEFT      RIGHT  
14. LEFT      RIGHT

- III. For each pair, choose the preferred scene.

15. LEFT      RIGHT  
16. LEFT      RIGHT  
17. LEFT      RIGHT  
18. LEFT      RIGHT  
19. LEFT      RIGHT  
20. LEFT      RIGHT  
21. LEFT      RIGHT

- IV. Choose the preferred drinking water source.

22. LEFT      RIGHT

- V. For each pair, choose the group you would prefer to meet or see.

23. LEFT      RIGHT  
24. LEFT      RIGHT  
25. LEFT      RIGHT  
26. LEFT      RIGHT  
27. LEFT      RIGHT  
28. LEFT      RIGHT  
29. LEFT      RIGHT  
30. LEFT      RIGHT  
31. LEFT      RIGHT  
32. LEFT      RIGHT  
33. LEFT      RIGHT  
34. LEFT      RIGHT  
35. LEFT      RIGHT  
36. LEFT      RIGHT  
37. LEFT      RIGHT  
38. LEFT      RIGHT

VI. Please answer these questions about yourself.

39. How many times have you visited Aravaipa Canyon Wilderness?

DURING THE PAST 12 MONTHS? \_\_\_\_\_ TIMES

DURING THE PAST 36 MONTHS? \_\_\_\_\_ TIMES

DURING YOUR LIFETIME? (approximately) \_\_\_\_\_ TIMES

40. How often do you visit wilderness areas during one year?

1 MORE THAN TEN TIMES A YEAR

2 6-9 TIMES A YEAR

3 3-5 TIMES A YEAR

4 1-2 TIMES A YEAR

5 I USUALLY DON'T VISIT WILDERNESS AREAS

41. Please tell us your age. \_\_\_\_\_

42. Please indicate your sex.                      1 MALE    2 FEMALE

43. Are you a member of any of these groups?

1 A NATURE CONSERVATION GROUP  
(like the Sierra Club)

2 A WILDLIFE CONSERVATION GROUP  
(like the Audubon Society)

3 AN ORV CLUB

4 A HIKING CLUB

5 A FISHING OR HUNTING CLUB

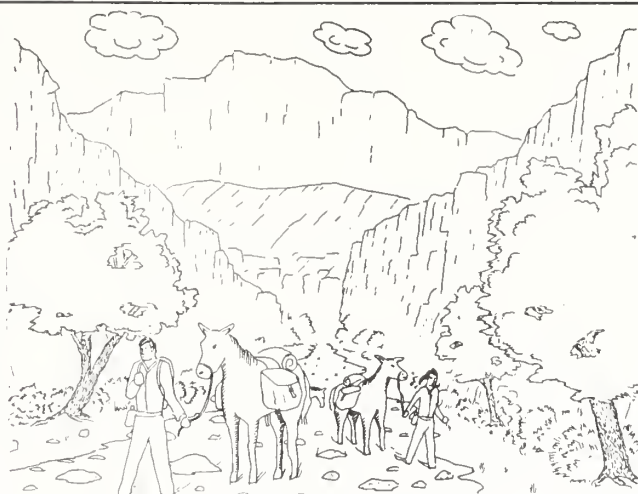
6 A YOUTH ORGANIZATION  
(like the Girl Scouts)

7 OTHER, (please specify): \_\_\_\_\_

44. Please give us your zip code: \_\_\_\_\_
45. About how many people (besides people in your party) did you meet or see during your visit?  
\_\_\_\_\_ PEOPLE
46. About how many other groups did you meet or see during your visit?  
\_\_\_\_\_ GROUPS
47. How many people are in your party? \_\_\_\_\_ PEOPLE
48. How many children (under 12 years old) are in your party?  
\_\_\_\_\_ CHILDREN
49. About how far did you travel into Aravaipa Canyon Wilderness? (A map is available for reference.)  
\_\_\_\_\_
50. Please indicate your total household income (before taxes):
- |                     |                      |
|---------------------|----------------------|
| 1 UNDER \$6,000     | 7 \$30,000-\$34,999  |
| 2 \$6,000-\$9,999   | 8 \$35,000-\$49,999  |
| 3 \$10,000-\$14,999 | 9 \$50,000-\$74,999  |
| 4 \$15,000-\$19,999 | 10 \$75,000-\$99,999 |
| 5 \$20,000-\$24,999 | 11 \$100,000 OR MORE |
| 6 \$25,000-\$29,999 |                      |

Please use the remaining space to provide any comments you may have about Aravaipa Canyon Wilderness.

THANKS FOR YOUR HELP!



How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

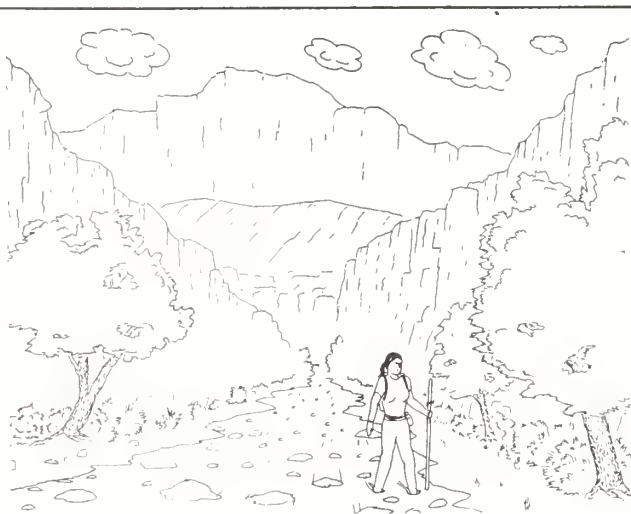
(Circle one answer on your answer sheet.)



How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

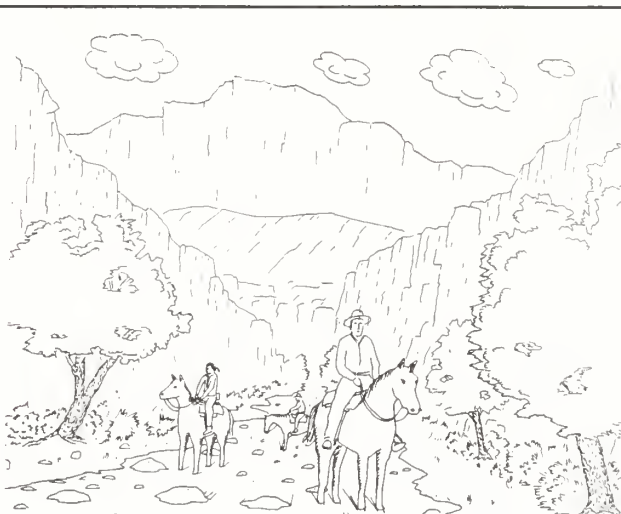
(Circle one answer on your answer sheet.)



How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

(Circle one answer on your answer sheet.)

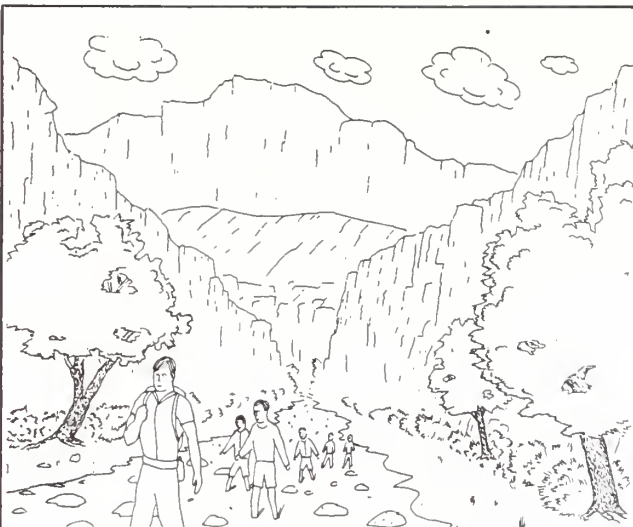


How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

(Circle one answer on your answer sheet.)

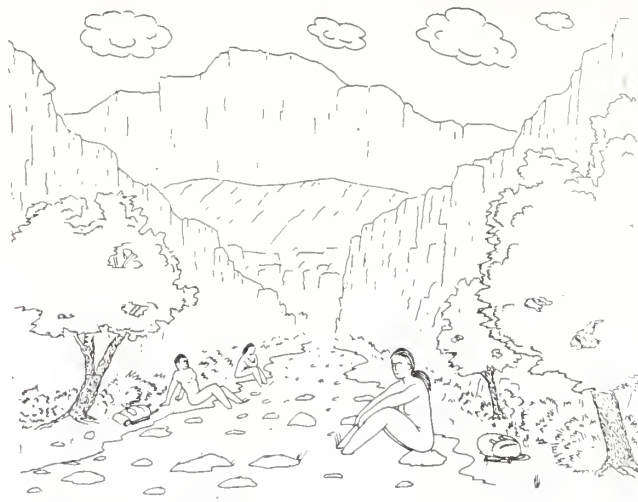




How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

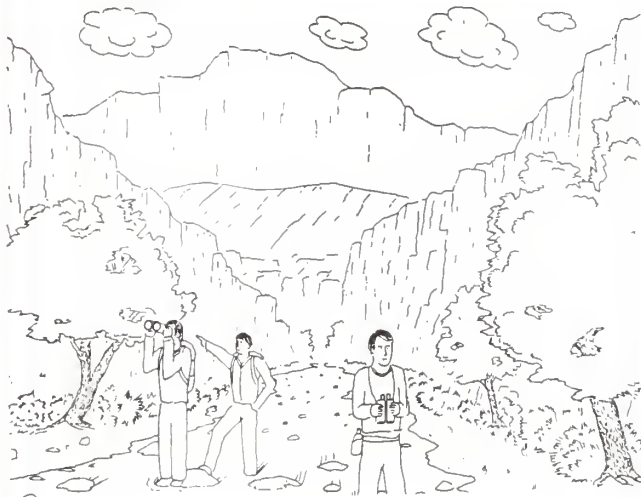
(Circle one answer on your answer sheet.)



How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

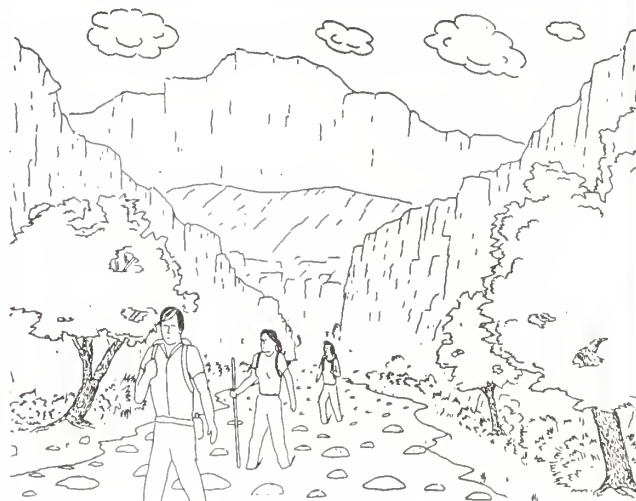
(Circle one answer on your answer sheet.)



How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

(Circle one answer on your answer sheet.)



How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

(Circle one answer on your answer sheet.)



How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

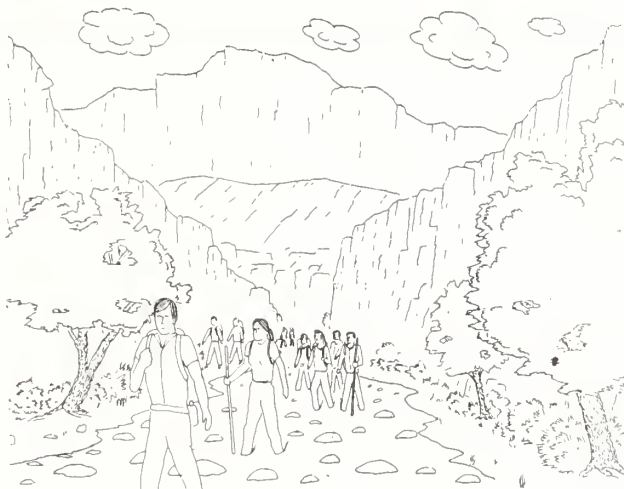
(Circle one answer on your answer sheet.)



How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

(Circle one answer on your answer sheet.)



How many times would you find it acceptable to meet or see this group during a one day visit?

- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

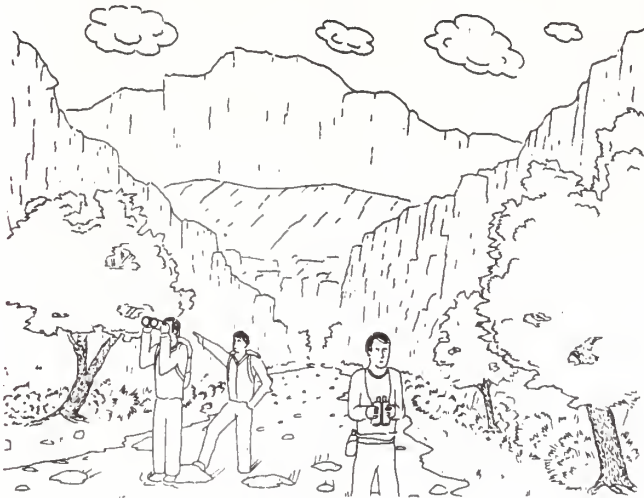
(Circle one answer on your answer sheet.)



How many times would you find it acceptable to meet or see this group during a one day visit?

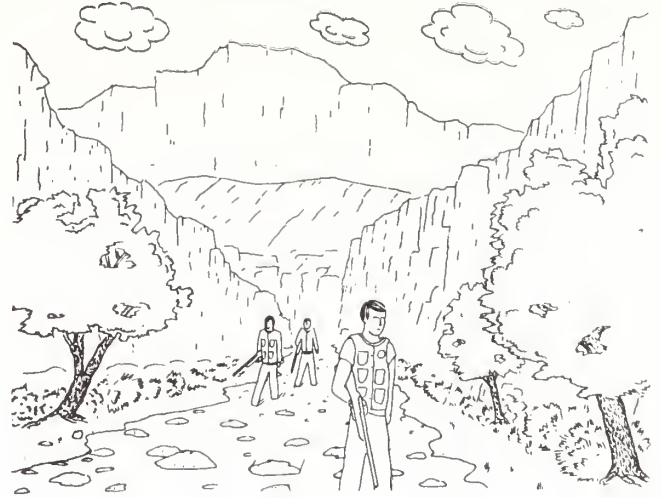
- 0 ZERO TIMES
- 1-2 ONE TO TWO TIMES
- 3-5 THREE TO FIVE TIMES
- 6-10 SIX TO TEN TIMES
- 10+ MORE THAN TEN TIMES

(Circle one answer on your answer sheet.)



LEFT

Which group would you prefer to meet or see?  
 (Please circle one answer on your answer sheet.)



RIGHT

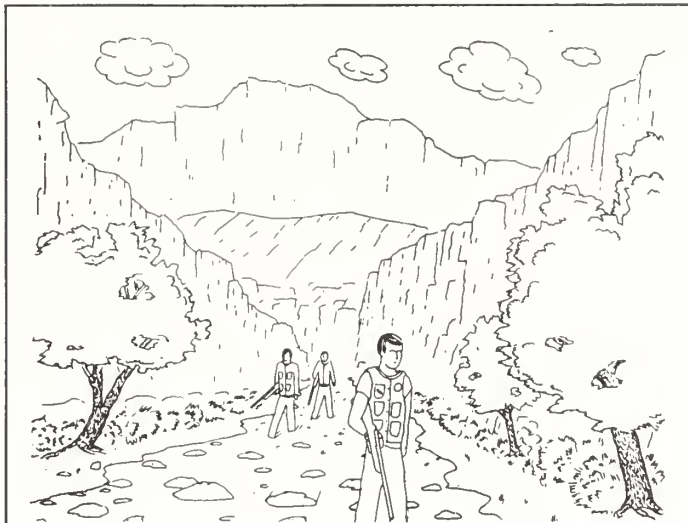


LEFT

Which group would you prefer to meet or see?  
 (Please circle one answer on your answer sheet.)

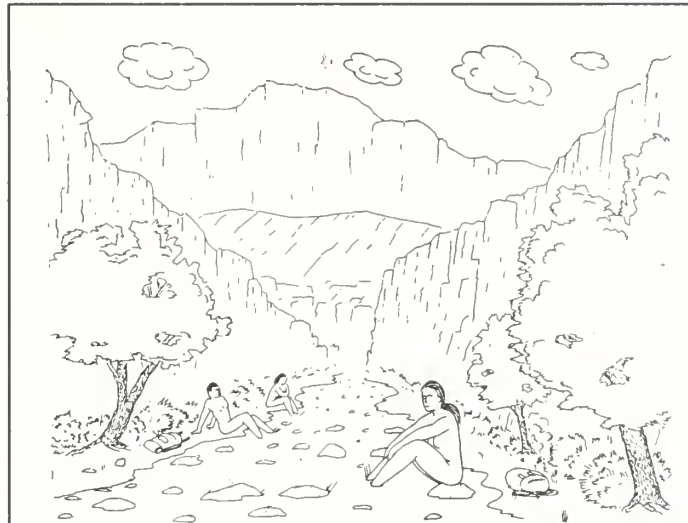


RIGHT

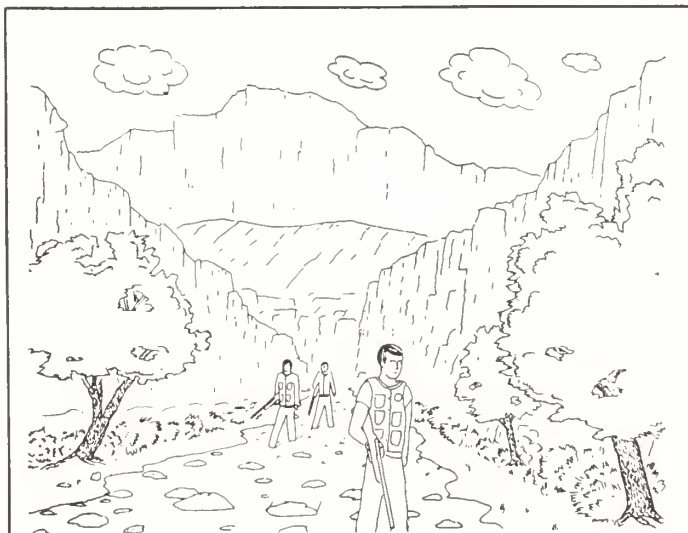


LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)

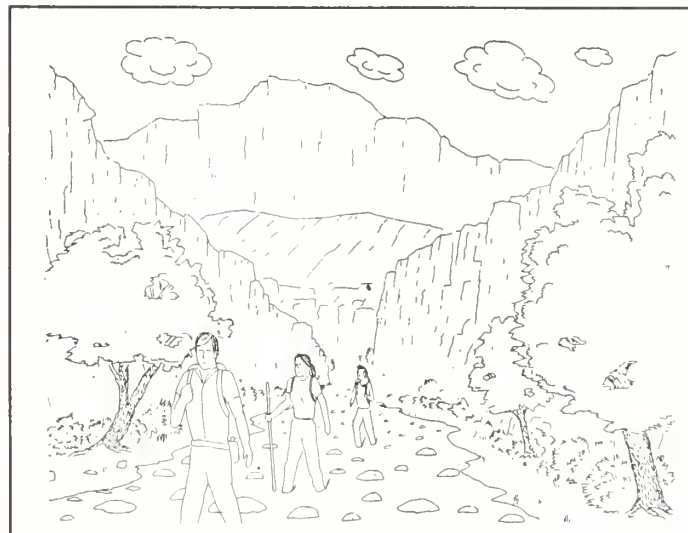


RIGHT



LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)



RIGHT



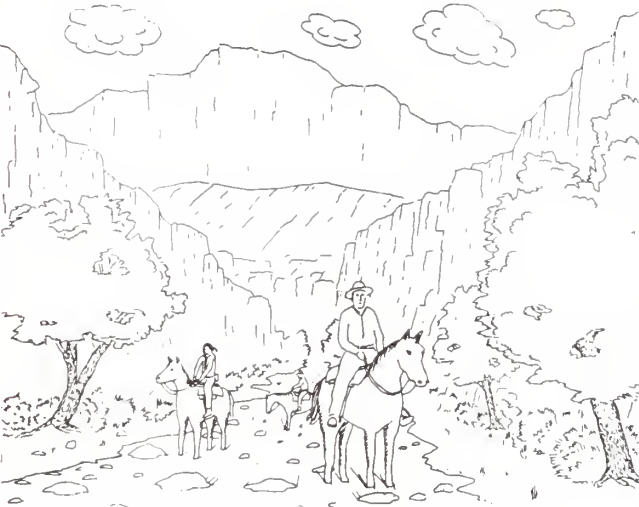


LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)

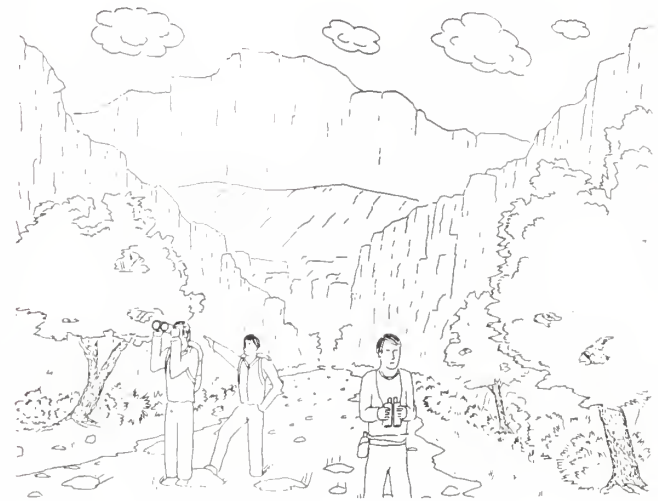


RIGHT



LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)



RIGHT



**LEFT**

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)



**RIGHT**

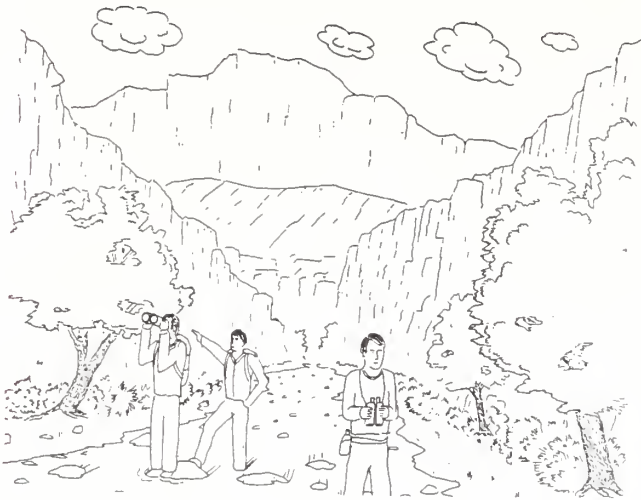


**LEFT**

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)



**RIGHT**

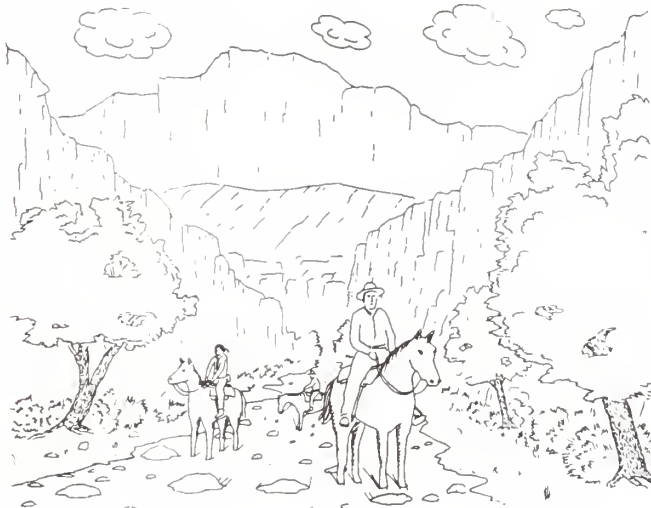


LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)

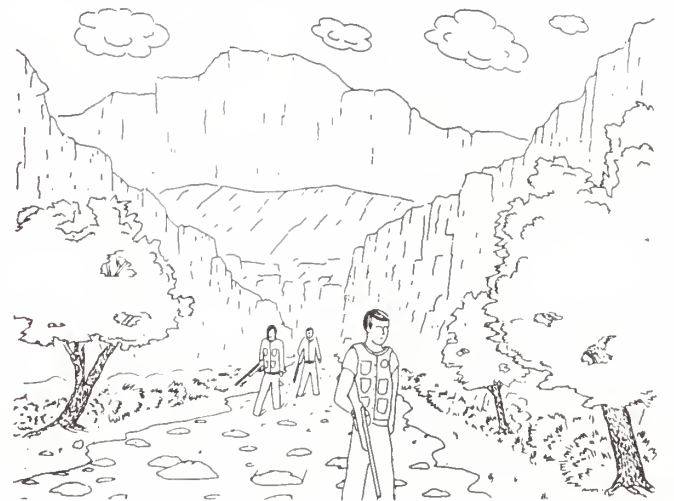


RIGHT



LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)

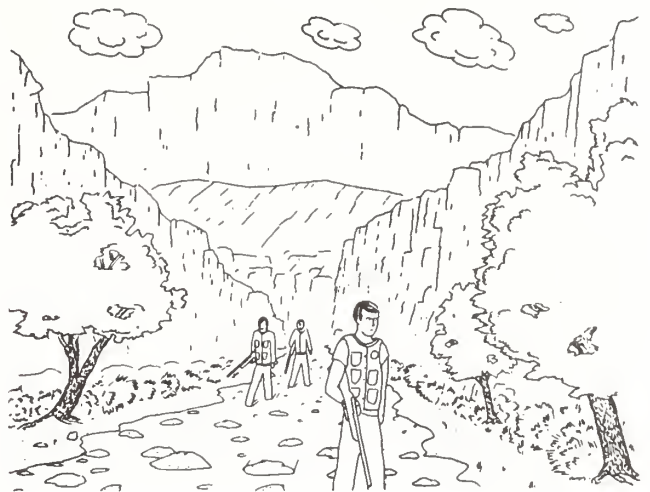


RIGHT

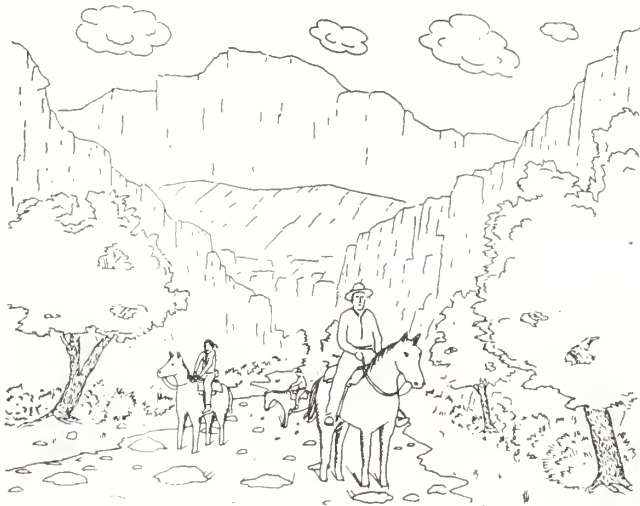


LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)



RIGHT



LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)



RIGHT



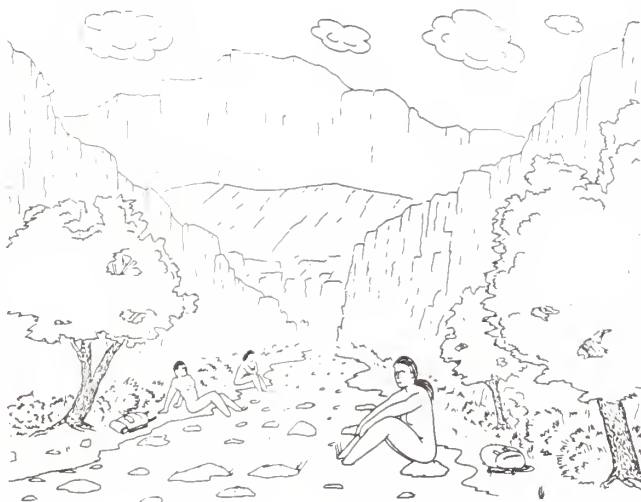


LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)



RIGHT

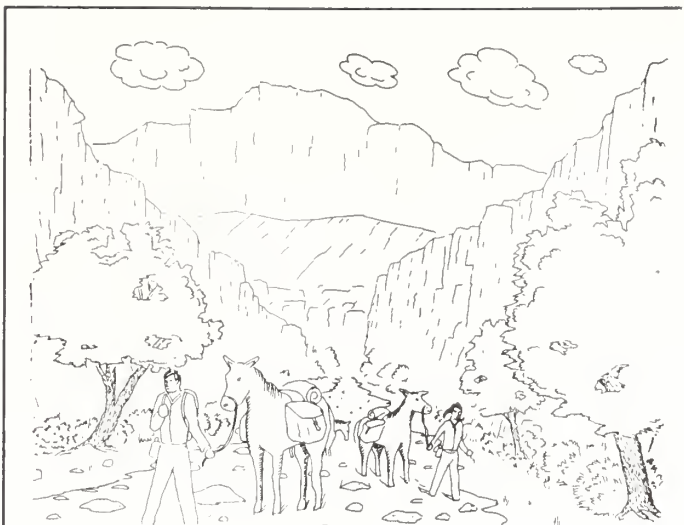


LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)

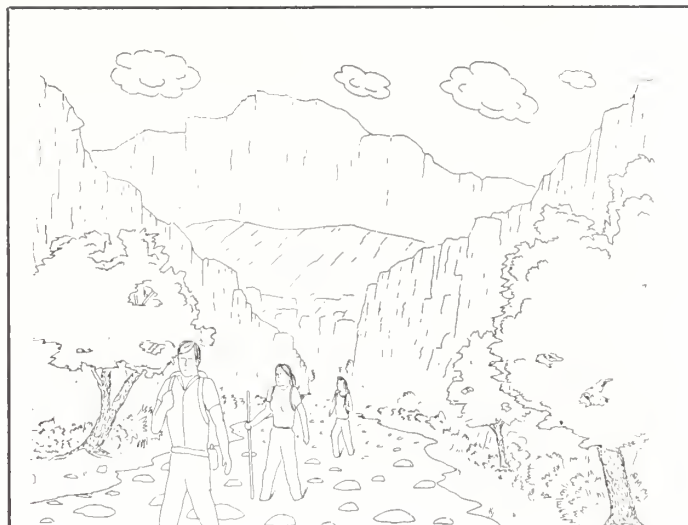


RIGHT



### LEFT

Which group would you prefer to meet or see?  
(Please circle one answer on your answer sheet.)



### RIGHT



# APPENDIX 2: WILDERNESS VALUE SCALES

Five wilderness value scales were constructed from 13 items in questions 2, 3, 4, and 5 (see table 2 chapter 3). A covariance matrix was first constructed from the items and confirmatory factor analysis (Long 1983; Jöreskog and Sörbom 1982) was used to fit a rigorous mOdel to the matrix. In the model, each item loaded on only one factor (figure 1). This model failed ( $\chi^2 = 249.33$ , d.f. = 55,  $p = .000$ ). Consequently, using modification indices as a guide (Long 1983; Jöreskog and Sörbom 1986), one loading at a time, variables were allowed to load on more than one factor (in a theoretically consistent manner) until an adequate fit ( $\chi^2 = 59.95$ , d.f. = 48,  $p = .116$ ) was obtained. The final model is depicted in figure 2. Factor loadings are presented in figure 2, regression scores are presented in table 2, and correlations between the coefficients are presented in table 3.

To determine whether the scales could be summed to produce a total "wildernism" score, we attempted to load all items on one factor. Theoretically, if such a summation could be accomplished, the scales would be additive. The proposed model, however, was not identified (an infinite number of solutions to the parameter estimates were possible; see Long 1986). Consequently, we concluded that the scales could not be added.

**TABLE 1**  
Covariance matrix used in the development of wilderness value scales  
and description of the variables. (N=664)

	INTERP	MAINT	NUDE	FLOOD	HALONE	BALONE	ONOWN	NEAR	RANGER	NOONE	SMOKE	CHAR	LIGHT
INTERP	1.872												
MAINT	.955	1.696											
NUDE	-.392	-.276	1.983										
FLOOD	-.381	-.333	.670	1.987									
HALONE	-.227	-.139	.607	.608	1.437								
BALONE	-.324	-.271	.343	.394	.680	1.328							
ONOWN	-.254	-.261	.366	.359	.634	.913	1.242						
NEAR	.312	.294	-.277	-.337	-.304	-.220	-.281	.870					
RANGER	.433	.361	-.437	-.394	-.328	-.134	-.239	.463	1.169				
NOONE	-.400	-.319	.426	.473	.388	.489	.413	-.390	-.328	1.389			
SMOKE	.241	.194	-.006	-.048	.070	-.136	-.117	.077	.017	-.180	1.018		
CHAR	.239	.168	-.025	-.058	.033	-.119	-.086	.074	.025	-.147	.569	.807	
LIGHT	.337	.278	-.083	-.073	-.004	-.205	-.143	.140	.116	-.174	.539	.413	.994

Variables in the matrix: (see appendix 1 for a more complete description of these items).

INTERP<sup>1</sup>: Interpretive or directional signs at points of interest (question 2K).

MAINT<sup>1</sup>: Maintained trails (question 2L)

NUDE<sup>1</sup>: Nude sunbathing or nude swimming (question 3T)

FLOOD<sup>1</sup>: Seeing a flood in ACW (question 3U)

HALONE<sup>1</sup>: Hiking alone (question 3U)

BALONE<sup>2</sup>: Being alone (question 4A)

ONOWN<sup>2</sup>: Being on your own (question 46)

NEAR<sup>2</sup>: Being near others who can help if you need them (question 4C)

RANGER<sup>2</sup>: Knowing that rangers are on patrol (question 4D)

NOONE<sup>1</sup>: No one else at all in ACW (question 5A)

SMOKE<sup>1</sup>: Smoke from campfire in ACW (question 2A)

CHAR<sup>1</sup>: Charred logs and ash from campfires (question 2C)

LIGHT<sup>1</sup>: Light from other visitors' campfires (question 2C)

<sup>1</sup>Coded 1=strongly dislike; 2=dislike; 3=neutral; 4=like; 5=strongly like

<sup>2</sup>Coded 1=not important; 2=slightly important; 3=moderately important; 4=very important



**TABLE 2**  
**Factor scores for the solitude scale. (N=664)**

VARIABLES <sup>1</sup>	CONVENIENCE	SELF-RELIANCE	NATURISM	SOLITUDE	PRISTINE
INTERP	.381	.071	-.026	-.004	.023
MAINT	.261	.048	-.018	-.002	.016
NUDE	-.011	-.059	.200	.002	.001
FLOOD	-.012	-.061	.206	.002	.001
HALONE	-.011	-.071	.238	.070	.043
BALONE	-.013	.004	.016	.621	-.028
ONOWN	-.020	-.085	.036	.190	-.005
NEAR	.059	.315	-.114	.001	-.011
RANGER	.067	.360	-.129	.033	-.014
NOONE	-.025	-.119	.044	.031	-.019
SMOKE	.045	-.026	.003	-.015	.524
CHAR	.029	-.017	.002	-.009	.335
LIGHT	.028	.049	-.020	-.005	.198

<sup>1</sup> See Table 1 for descriptions of the variables.

**TABLE 3**  
**Values of Phi, correlation matrix of the common factors. (N=664)**

	CONVENIENCE	SELF-RELIANCE	NATURISM	SOLITUDE	PRISTINE
CONVENIENCE	1.000				
SELF-RELIANCE	.536	1.000			
NATURISM	-.374	-.690	1.000		
SOLITUDE	-.265	-.358	.421	1.000	
PRISTINE	.303	.099	-.049	-.166	1.000

**FIGURE 1**  
**Confirmatory factor model with each item**  
**loading only on one factor. N=664**

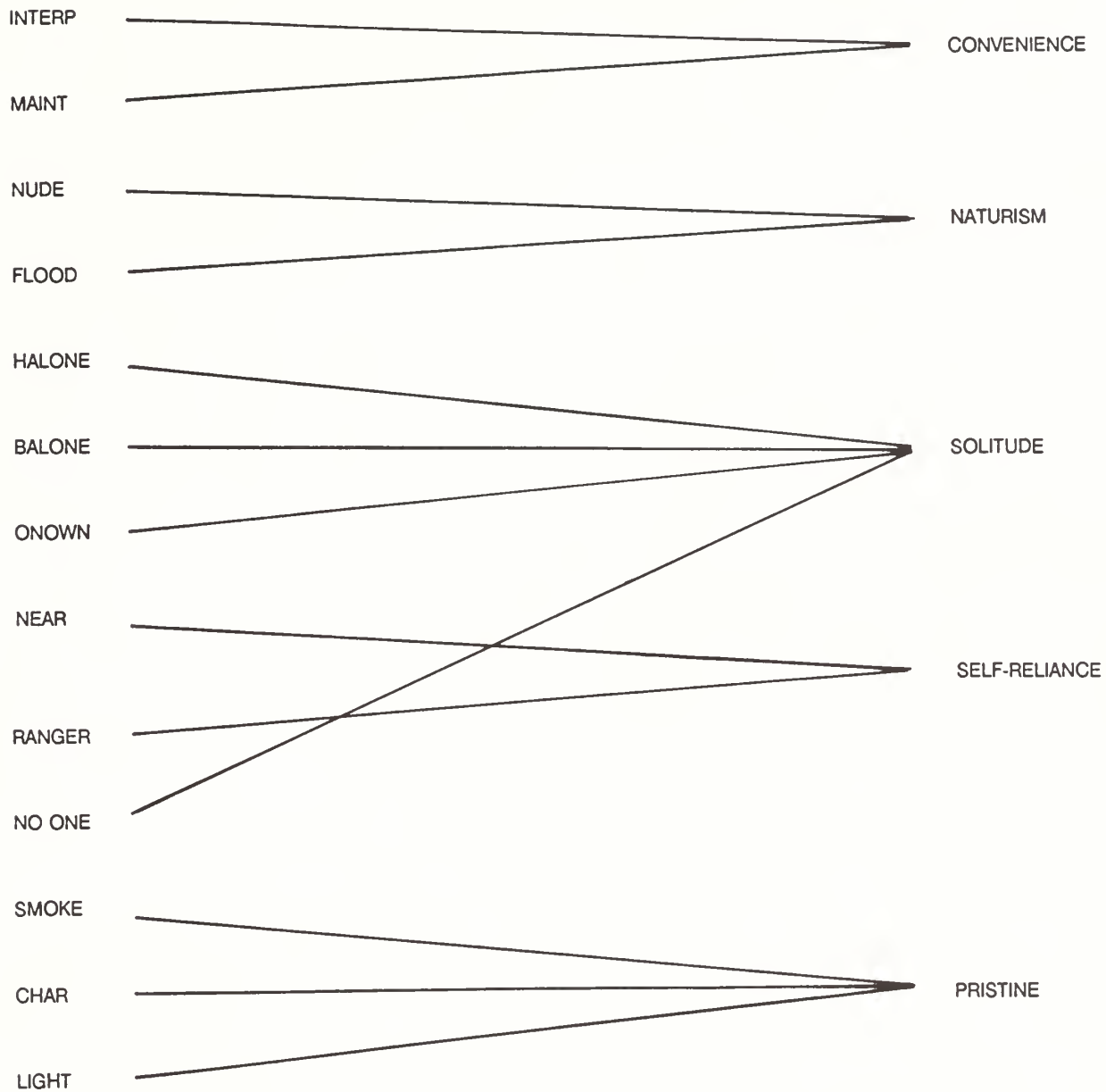
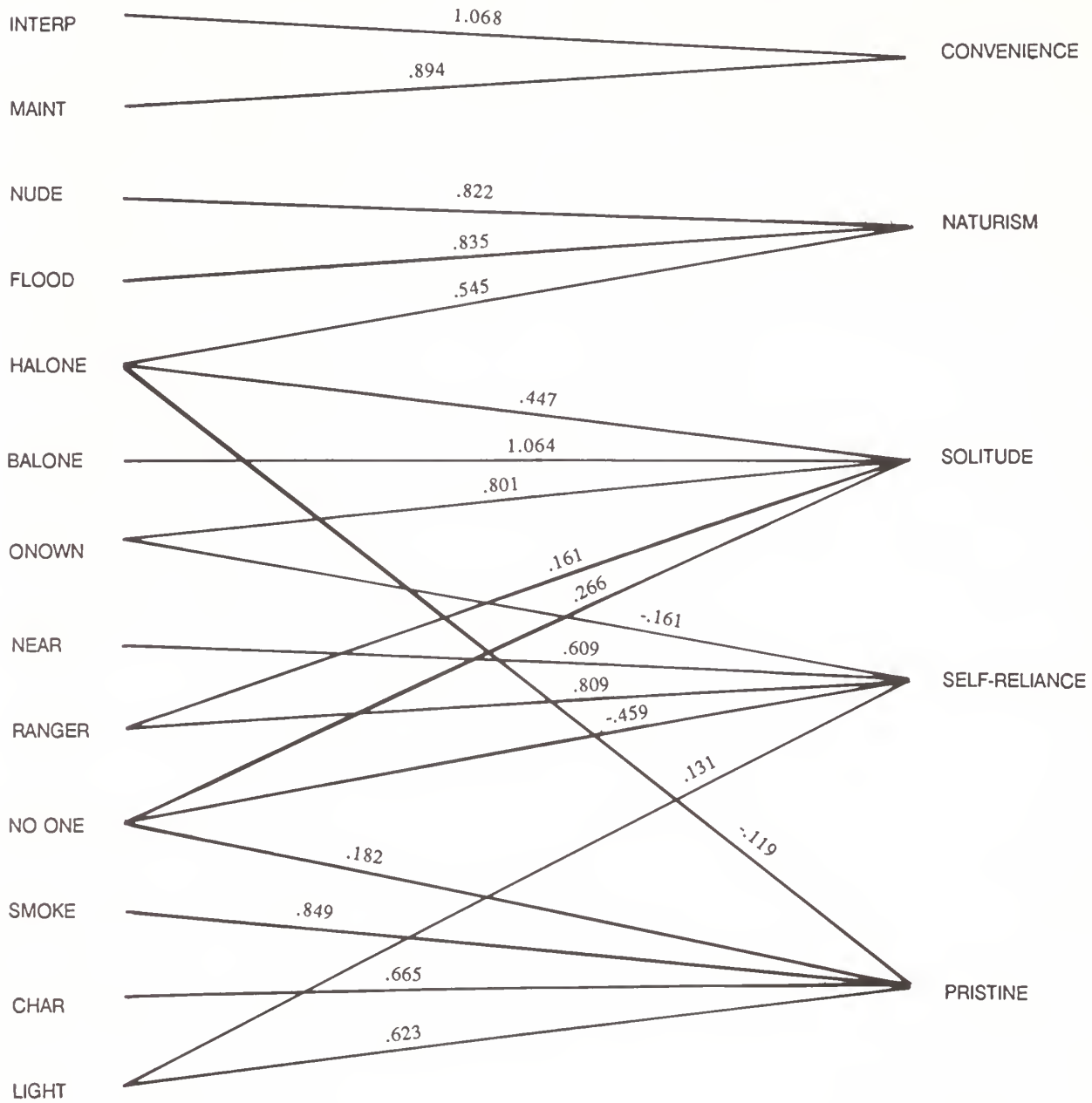


FIGURE 2

Final confirmatory factor model  
with relaxed parameters. N-664



All parameter values are significant at  $p < .05$ .

# APPENDIX 3: CONSUMER PROFILE

A profile of respondents was developed with cluster analysis. Eight questionnaire items, with a mixture of categorical and continuous variables, were selected for analysis (table 1). Categorical variables were recoded to an ordinal scale (see table 1 for scale values). After all variables were normalized to a mean of 0 and variance of 1, they were clustered into five groups with QUICK CLUSTER (SPSSX 1986). QUICK CLUSTER is an iterative-proportional fitting algorithm that uses squared euclidean distances to define cluster centers. Means and confidence intervals for the variables in each cluster are provided in table 2.

To informally validate this method, a sample of the cases was also clustered using Ward's method, a hierarchical agglomerative technique (Long 1986). With Ward's method we confirmed the choice of five clusters (using an agglomeration schedule [SPSSX 1985] as a guide), but judging from the means of the variables, cluster assignments appear to vary according to the method chosen (table 3). Because the two cluster assignments vary, the QUICK CLUSTER results should be considered tentative in the absence of more rigorous validation.

**TABLE 1**  
**Variables used in development of a consumer profile**  
**with cluster analysis.**

QUESTION (Q) AND VARIABLE	SCALE
Q8 Lifetime visits	Continuous
Q16 Gender	1 = male, 2 = female
Q17 Highest level of education	0, 8, 10, 12, 14, 16, 17, and 18 years
Q18 Age in years	Continuous
Q20 Description of residence location	750,000; 325,000; 100,000; 30,000; and 6,250 population
Q21 Total household income	\$3,000; \$8,000; \$12,500; \$17,500; \$22,500; \$27,500; \$32,500; \$42,500; and \$128,000
Q52 Number of people in the party	1.5, 3.5, 6, 9, 13 people
Q53 Number of children in the party	Continuous
Mean of open ended income category ( $\geq$ \$50,000) estimated with a Pareto curve.	
Mean of open ended group size category (11 or more) estimated with a Pareto curve.	



**TABLE 2**  
**Mean and confidence intervals for all variables in each cluster of the consumer profile.**

VARIABLE	I	II	III	IV	V
Q8: Lifetime visits	5.82 <sup>1</sup> (±1.82)	2.96 (±1.01)	2.98 (±0.36)	2.78 <sup>1</sup> (±2.71)	66.04 (±17.53)
Q16: Gender	1.16 (±.10)	1.22 (±.11)	1.41 (±.05)	1.26 (±.90)	1.46 (±.62)
Q17: Highest level of education	16.84 (±.37)	13.90 (±.41)	16.38 (±.16)	16.37 (±3.27)	15.89 (±2.17)
Q18: Age	42.42 (±2.63)	52.39 (±3.21)	37.02 (±.91)	39.80 (±20.54)	39.79 (±4.22)
Q20: Residence location	615,723 (±67,821)	201,668 (±71,532)	536,668 (±29,473)	562,208 (±433,994)	695,596 (±176,181)
Q21: Income	\$91,418 (±\$12,151)	\$38,416 (±\$9,079)	\$52,566 (±\$4,446)	\$76,351 (±\$95,192)	\$46,242 (±\$56,763)
Q52: Number of people in party	9.44 (±.81)	3.55 (±.70)	2.66 (±.17)	10.19 (±8.92)	3.56 (±1.95)
Q53: Number of children in party	2.24 (±.86)	.22 (±.19)	.18 (±.06)	15.19 (±7.93)	0 (±0)
	N = 56.9	N = 60.2	N = 390.8	N = 3.4	N = 5.3

<sup>1</sup>Means and 95% confidence intervals about the mean.

**TABLE 3**  
**Consumer profile computed using Ward's method and a sample of the entire population.**

VARIABLE	I	II	III	IV	V
Q8: Lifetime visits	2.61 <sup>1</sup> (+2.19)	4.05 (+1.01)	3.76 (+4.20)	2.95 (+0.54)	56.14 (+47.76)
Q16: Gender	1.38 (+0.14)	1.06 (+0.10)	1.00 (+0.63)	2.02 (+0.18)	1.64 (+1.69)
Q17: Highest level of education	16.59 (+0.51)	15.98 (+0.38)	17.07 (+1.91)	16.18 (+0.65)	15.29 (+5.92)
Q18: Age	41.94 (+3.64)	38.68 (+2.93)	41.29 (+10.58)	33.04 (+4.11)	43.57 (+11.51)
Q20: Residence location	573,557 (+93,813)	525,966 (+65,408)	750,000 (+341,794)	460,563 (+86,805)	750,000 (+480,012)
Q21: Income	\$125,587 (+\$16,808)	\$31,218 (+\$8,302)	\$84,822 (+\$51,563)	\$25,027 (+\$19,039)	\$28,925 (+\$154,654)
Q52: Number of people in party	3.01 (+1.12)	2.94 (+0.64)	12.10 (+1.92)	3.60 (+1.78)	4.39 (+5.30)
Q53: Number of children in party	.34 (+1.18)	.18 (+0.17)	6.04 (+0.70)	.62 (+1.59)	.00 (+.00)
	N = 31	N = 72	N = 5	N = 35	N = 2

<sup>1</sup>Means and 95% confidence intervals about the mean.



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